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PHILOSOPHY.

MAN AND EVOLUTION.

BY THE LATE PROF. B. F. MUDGE.

EMBRYOLOGY.

Let us take man as a single species of the animal world, and see if there is anything in his history or physical construction which justifies the conclusion that he has been developed from the ape or any lower type. Here, in the beginning, we are met with the claim that Embryology is entirely against us. While we admit that on a hasty examination of that branch of natural history it appears to favor evolution, yet we think the claim in favor of development will not bear careful scrutiny. Evolutionists tell us that the human subject before birth passes through all stages of animal life, from the mollusk through the type of fish, reptile, bird, dog, and monkey, to man. Some have even given the exact stage and month * in which we were each one of these lower animals before birth.

Our answer to this is that, while the embryo may, at its very early stages, have some approach to an elementary form, it is in appearance only, and not in reality. That the future man is, from the starting point, a human being, is apparent from the fact that the traits of the father are constantly reappearing in the son from generation to generation. But if the offspring were ever fish, reptile or monkey, and developed during gestation into a man, it would be, when born, only human

* See preliminary table in Vestiges of the Natural History of Creation.

and never endowed with the personal traits of the father. The mother might give it a human form, but neither father nor mother could impress any personal traits upon the child. But we see, every day, in the color of the hair, contour of the face, the gait, and tone of the voice, the father reproduced in the son. We notice it at the first sight of the child or grandchild of an old acquaintance.

More than this, if we will go to the monuments and tombs of Egypt, we shall see, depicted on their walls, the faces of the oldest residents of Thebes and Memphis—the Copt, Bedouin, Fellah and Jew; and you can go among the inhabitants of that country to-day, and select the representatives of the portraits, 3,500 years old, and see the traits of fathers reproduced after more than a hundred generations. The Hebrew of old Egypt gives the same contour of face and physiognomy which his descendants exhibit in the cities of America, and this, too, when that race has been an inhabitant of all the various climates of the world. Could the personal minor traits have been preserved from father to son, if man had in that period been a hundred times a fish, reptile, dog, and monkey?

But we are not left without some facts to aid us on the question of Embryology. The spermatozoa of man and other male animals are so entirely different, in relation to size and shape, that we need not give diagrams to prove the fact.* Though exceedingly small, the sperm cells of our common animals not only differ from those of man, but they persistently differ, each from the other, in size and form. Yet these minute, microscopic spermatozoa of the father fix the future lineaments of the child, including its mental traits and tendency to inherit mental diseases.

The human ovum has not, for various reasons, been so carefully examined under the microscope as the sperm cell; consequently we cannot speak of its clear difference from the ova of other mammalia. The germinal spot in the ovum from which the embryo man is formed is, according to Gray, only from $\frac{1}{3600}$ to $\frac{1}{2400}$ of an inch long.

As we find the male sperm cell so much unlike that of all other mammalia, so we have a right to expect the female germ cell, if we could submit it to an equally high power of the microscope, would be equally human in its structure. When this shall be done, we believe as marked a difference will be found between human and animal ova as between the spermatozoa. This opinion is strengthened by the fact that the Graafian vesicle, or ovisac, which contains the ovum, varies in structure in different genera of mammals. It would be a great anomaly in nature if, while the male element and the Graafian vesicle are so distinct, the female germ cells should be alike in all mammalia. As its first segmentation after impregnation shows it to be a vertebrate, and not a mollusk nor crustacean, so almost the next change shows a difference from other vertebrates in its embryonic condition. Before the first month it can readily be distinguished from fish or reptile. By the twentieth day the segments which form the different portions of the head are developed, and by the end of the first month the human head is clearly defined.

*See Carpenter's Physiology, § 843, p. 750, plate I; Dalton's Physiology, p. 557; Morel's Human Histology, plate XXI.

The latter change deserves especial notice. The head, or cephalic, development is more prominent and clearly defined than other portions of the body. The brain cavity is large from the early portion of the second month. The brain matter is very albuminous and very human. The forehead is even larger than in the developed babe, and it is a well known fact that children at birth have relatively larger brains than mature men. Instead of requiring nine months to pass through the various stages from mollusk to monkey, it is, in less than one-fourth of the period of gestation, so well developed that the head cannot be mistaken for that of an ape.

At less than two months the difference in the sex can be detected, and at the close of the second month the toes, fingers, mouth and nose are clearly formed.* The heart, which during the first month is as simple as that of a reptile, does not long continue so. Carpenter says:

"A change in the type of the circulatory stystem of the fœtus, from that first presented by it, takes place at a very early period. At about the fourth week in the human embryo a septum begins to be formed in the ventricle, and at the eighth week it is complete. * * * During the same period a transformation occurs in the arrangement of the arterial trunks proceeding from the heart, which ends in their assumption of the form they present until the end of the fœtal life; and this undergoes but a slight alteration when the plan of the circulation is changed at the moment of the first inspiration." †

Thus before the human fœtus has passed through one-fourth of its period of gestation, it becomes distinctly human in sex, circulation and brain; and after that period, if not sooner, its resemblance to lower types of animal life exists only in imagination.

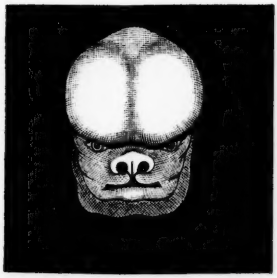

Fig. 13.

We give in Figure 13 the head of a fœtus "about the end of the second month," from Dalton.‡ It will be seen that, so far from a resemblance to a low vertebrate, it is superior to the highest ape. Instead of a resemblance to any of the lower types in its embryonic state, the "cephalization"‖ is almost an exaggeration. According to Dalton, the brain encephalon of the new-born infant exceeds that of the adult man in the proportion of 148 to 23, or relatively more than six times larger. If cephalization§ is a standard of rank, as all our best scientists agree, surely the human infant, either before or after birth, is in no sense typical of a low form.

We are aware that there are some scientists of high reputation that have made

* Carpenter's Human Physiology, plate I.
† Human Physiology, § 895.
‡ Human Physiology, Fig. 245.
‖ Cephalization—the brain and head structure compared with other parts of the body.
§ *Ibid*, p. 689, quoting Cruveilhier, Solly, Wilson, etc.

statements at variance from this. Packard says: "The human form is clearly indicated by the seventh week, the subsequent changes consisting in the remodeling of the outlines, in which it passes through a generalized ape-like figure, until the human form is shaped out."* Instead of an ape-like figure, we have from the first month a head which is far from that likeness. Let any one visit any well provided medical museum in one of our large cities, and he will find a set of embryo skeletons for each month. From them he will see that the head is not ape-like, but the fully developed brain, in all stages, is clearly defined. In size and proportions it is most strikingly human, and the only objection is that the resemblance is to a type more intellectual than man. Nor is the figure in hands and feet related to the ape, but the fingers and toes are seen in the second month. This fact will be apparent by consulting any good illustrated work on midwifery or human physiology.† The limbs and fleshy portions of the early fœtus are also unlike the ape form.

Darwin gives us a figure‡ from Ecker, of a human embryo ten lines long, having a clearly defined tail, which he compares with the embryo of a dog, relatively much farther advanced, having a similar tail. We have sought in vain in all our standard works on physiology for a similar form in a fœtal state, though the books abound in diagrams of the earliest shapes. We have also examined many fœtal embryos, some of even less size and in an earlier stage of gestation than Ecker's example, and never found one similar to it. Nor on inquiry of physicians of extensive practice, have we met with any who has seen such a form. Aside from the tail, the head and vertebræ are relatively more advanced than the arms and legs in specimens coming under my observation. It is true, that in the human embryo the coccyx, which represents the tail, is proportionally larger than in the adult, but, in all the cases we have examined, it lies under the skin as in the mature individual. Ecker's figure gives twenty-one clearly defined vertebræ (omiting the cervical) in process of development. We have never found the vertebræ so distinct in embryos twice as old. The first rudimentary back-bone is so inditinct and covered with flesh that it cannot be seen in an ordinary specimen at so early a stage. Even when the vertebræ are found, by dissection, as clearly as there delineated, the limbs, with fingers and toes, are distinctly outlined. But in Ecker's figure the legs and arms are only round, blunt knobs. From all these facts, we conclude that his example is not a normal one, but in reality an imperfect fœtal form. Either his, or all I have seen, are not ordinary specimens of fœtal development.

Commenting on this figure (and others where the head and neck are correctly represented), Darwin says: ‖

"At this period the arteries run in arch-like branches, as if to carry the blood

* Life History of Animals, Including Man, p. 238.
† See Leisman's Midwifery, p. 131, fig. 73; Flint's Human Physiology, edition of 1876, plate III, fig. 1.
‡ Descent of Man, fig. 1, p. 15.
‖ Descent of Man, p. 14.

to branchiæ which are not present in the higher vertebrata, though the slits on the sides of the neck still remain, marking their former positions."

These "slits" other evolutionists have frequently claimed as gill openings. They, however, are not slits or the marks of slits, but are, as Gray and others have plainly shown, the pharyngeal arches, which a little later become developed into jaws, hyoid bones and soft parts of the neck. No one has ever found the semblance of gills, and these so-called slits are clearly not connected with gills, lungs or with any breathing organ. On the other hand, the lungs of the human embryo, as soon as it has any definite shape, assume the mammilian form. Low reptiles, like the salamanders, have, as lungs, two long cylindrical sacks, extending nearly the entire length of the body. The higher type of reptiles, like the frog, have broader, flat lungs, but the position in the body and the arrangement of the cells and small air tubes are still quite reptilian. The lungs of the birds, the type next above the reptiles, are, as is well known, very peculiar, and line much of the interior of the body. But the position of the lungs in the human fœtus is, from its earliest stages, always in the chest, and they never assume the reptilian or bird form in shape or in the arrangement of their air passages. These various facts can be verified by any one who will dissect an aborted fœtus in its earliest stages, and compare its internal structure with the low animals which we have named. The little form, three-fourths of an inch long, has limbs that have not the least shape resembling the fin of a fish or wing of a bird.

The development of the embryonic heart, in like manner, does not pass, as it is asserted, through the fish and reptilian types. True, in the earliest stage it has but two cavities, irregular in shape, which might, by an effort of the imagination, be considered as similar in form to the double chambers of the heart of the fish. But these two imperfect chambers lie side by side as in the double heart of all mammals, while in the fish one lies in front of the other, as auricle and ventricle should. But, if we allow this stage to be fish-like, the next stage is not reptilian, as evolutionists have claimed; for the fœtal heart at its next stage has not the three chambers, one ventricle doing double duty to a pair of auricles, but two ventricles and two auricles, with the double circulation of a perfect organ of the high mammalian structure. This is complete at the second month of gestation, when, according to the author of the Vestiges of the Natural History of Creation, it is yet in its supposed fish stage. It must, however, be clearly kept in mind that the circulation and purification of the blood in the embryo are not by the action of its own heart and lungs, but, up to the moment of birth, they are by the action of the heart and lungs of the mother, the current passing through the umbilical cord.

We shall be reminded, also, that man has some rudimentary, useless muscles and organs, some of which are useful in the lower animals. This certainly favors the development theory; but we think that more importance has been credited to the facts than they deserve.

The *appendix vermiformis*, so useless and sometimes so injurious in man, is

supposed to have been derived from an animal of a lower type. But as it is found in marsupials * and some of the monkeys, mammals most widely separate, and not in most of the intermediate types, and is always a useless organ, we cannot perceive that it has any bearing on this question.

The caudal muscles, so useful in animals with a tail, are found rudimentary in man. They are also found in nearly all of the tailless apes, and if derived from the lower orders of monkeys, why did not the development which shed the tail act harmoniously and drop the caudal muscles also, or at least shed them entirely before the ape could have made that much greater advancement and become a man?

In this connection it is well to recollect that a tail has little or no connection with the rank of an animal. Man has four caudal vertebræ, and many of the higher apes have the same number, and also the low, slender lemur (*loris*), while the Barbary ape (*Macacus Inuus*) has but three. On the other hand, the *Semnopithecus*, higher in rank than the *Macacus*, has thirty-one. The reader will readily recall many common animals with very short tails.

FOSSIL MEN.

A careful examination of man's geological history confirms us in the opinion that he always has been a man, and was not derived from a lower type. As the theory of the extreme antiquity of our race is recognized very generally by the scientific world, we shall assume that fact as settled.

Dana, our greatest American geologist, places man "at least as early as the alluvian part of the warm Champlain era, and probably earlier." † As the Champlain era preceded the Delta period, and also the period of the elevation of land over the high latitudes of North America, we can hardly place this, on the received principles of geology, at less than 200,000 years.‡ The question then arises, What has been the condition of man during this long lapse of years, judging from his fossil bones and the remains of his domestic implements?

When the doctrine of the antiquity of the human family was in its early stages, the celebrated Neanderthal skull was found, presenting a singularly low intellectual conformation. The flat, receding forehead, prominent superciliary ridges, and other traits, were so characteristic of a low intellectual condition that it was immediately claimed as evidence that the oldest fossilized races were far lower than those now existing. This, in fact, is now claimed by some popular writers on the side of evolution. But subsequent discoveries have not sustained this conclusion. Though the Neanderthal skull has more than twice the cubic capacity of the gorilla or any other ape, no other fossil human skull has been found of so low a type; but, on the other hand, the large numbers since discovered, many of them far older than this, compare favorably with the existing races. The skeleton of the Neanderthal specimen does not differ from the average skeleton of living men.

* Huxley—Anatomy of Vertebrate Animals, p. 280.
† Manual, p. 576.
‡ See Kansas City REVIEW, August, 1879, p. 222.

The Borreby crania are the nearest in form and character to the Neanderthal, but Prof. Huxley states that there is a marked resemblance between them and the Australians.

On the other hand, the Engis skull, which is far older, probably twice as old as the Neanderthal, "approaches," in the language of Lyell, "near the highest, or Caucasian type." Huxley calls it a "fair average skull, which might have belonged to a philosopher, or might have contained the thoughtless brains of a savage." Dana says "the cranium was high and short, and of good Caucasian type, though of medium capacity."

The Calaveras head, from California, one of the very oldest, whose antiquity and authenticity are now so well established, though possessing some Indian traits, is nearly up to the average of the European. It was found 132 feet below the surface, under four beds of lava and in the fifth bed of gravel, alternately deposited in a gold mine. When first presented to the scientific world, its authenticity was doubted. Those who favored evolution objected to it because its structure was so near that of the skulls of the existing races. Not only has the average human cranium been preserved for so long a period, but many of the peculiarities of the typical Indian.

Prof. Whitney has quite recently presented some additional remains, between thirty and forty instances, from the same or similar beds, showing strong evidence that man is Pliocene. Then the Neanderthal skull is quite modern. Prof. Whitney adds, as one of his conclusions, "Man, thus far, is nothing but man, whether found in Plicene, Post-Pliocene, or Recent formations."

In 1875 there was exhumed near Worthing, England, the skeleton of a woman, which was presented and described by Prof. Rolleston at the meeting of the British Association.* It belonged to the earliest Neolithic age, and the skull had a cubic capacity of 105¾ inches, or about thirteen inches above the average of the European. The shape of the skull was of a good form, above a medium.

The oldest human remains known, excepting those of California, are probably those found at Mentone, near Nice, in 1872 and subsequently, and are of the Palæolithic age.† The best was in excellent preservation, and Rivière describes it as having "a rather long but large head, high and well made forehead, and very large facial angle—85°." Prof. Huxley gives a similar description.

It will thus be seen, from the few examples quoted, and which may be considered fair specimens of the whole, that fossil men differed as much among themselves as those now living, and at the same time were closely similar to the present races.

Broca, ‡ before the French Association, makes three races of pre-historic men, viz: Constadt, Cromagnon, and Furfooz. The names are derived from the three localities where the remains are found. The first, or oldest, he places in a

* See *Nature*, September 7, 1875, p. 419.
† *Nature*, September 7, 1875, p. 419.
‡ See a brief report in *Nature*, August 30, 1877.

low rank of intellect, but not lower than some now existing. This race is founded on a few bones, and, we believe, is represented by no entire skull. The Furfooz he also places in a low rank. But the intermediate, or Cromagnon race, he ranks as the highest, and says its crania are equal, if not superior, to the modern Parisian or in type closely approaching the Caucasian. It will thus be seen that Broca does not find a regular grading upward from an oldest low intellect to the highest in the modern, but that the intermediate pre-historic race was nearest to the best living races. The earliest are not more degraded in intellect than some of the present tribes of the human family. The oldest remains of man in Europe, where the search has been the most untiring, differed about as much as, but no more, from each other than those now living.

Broca's account appears to coincide with the observations of Huxley, Lyell and others, in giving the most ancient races an intellectual condition very similar to, if not identical, with those of the present day.

The tools and implements of the most ancient men are of rough stone, showing a low civilization; but the structure of the head shows the ability, from the first races, to become civilized. Just as the first fossilized hogs, from the beds of the earliest Eocene, were typical hogs, so the earliest men were in brain and skeleton identical with those of to-day.

There is no peculiarity in the structure of the skeleton of the oldest human remains which is not found in existing races. Nor is the size shown to be greater. The best Mentone man is probably the largest fossil, with one exception, of the human race, and he was not over six feet in height. The close resemblance between the first and the living races is recognized by the ablest authorities who favor evolution.

Wallace says: "The few remains yet known of pre-historic man, do not indicate any material diminution in the size of the brain case."*

Prof. Darwin says: "At the most ancient period of which we have as yet obtained any record, the races of man had already come to differ nearly or quite as much as they do at the present day."†

Huxley, after a long description of the oldest pre-historic skulls, says: "In no sense can the Neanderthal bones be regarded as the remains of a human being intermediate between man and the apes." He further adds: "The first traces of the primoidal stock whence man has proceeded, need no longer be sought by those who entertain the doctrine of progressive development, in the newest Tertiaries; but they may be looked for in an epoch more distant from the age of *Elephas primigenius* than that is from us."‡

Lyell, too, who claims a greater antiquity for man than Dana, in his last work says: "Yet, in spite of the long lapse of prehistoric ages during which man must have flourished on the earth, *there is no proof of any perceptible change in his bodily structure.*"||

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* Limit of Natural Selection, p. 336.

† Descent of Man, Vol. II, p. 366, American Edition.

‡ Observations on Human Skul's from Engis and Neanderthal.

Antiquity of Man, p. 540. The italics are ours.

Can any anti-evolutionist use stronger language? If two hundred thousand years, or, perhaps, five hundred thousand years—seven thousand or fifteen thousand generations—have not made "any perceptible change in his bodily structure," how long will it take to develop him from a reptile or from an ape?

If we follow others, as Abbott and Shaler, Tiddeman, Geikie, Pengelly, Ramsey, etc., in assigning man to an inter-glacial age, or Prof. Marsh, Whitney and others, that he may be from the Pliocene, the argument is still stronger in our favor; for, according to the authorities cited, no form intermediate between man and the apes has been found, and the structure of our race has been always the same. The farther back we accept the antiquity of the human family, either in geological deposits or in years, the more forcibly becomes the fact, that time and environment cannot have developed man from a low animal.

EVOLUTION AND CREATION.

BY GEORGE C. SWALLOW, M. D., LL. D., PROFESSOR OF AGRICULTURE AND OF NATURAL HISTORY, UNIVERSITY OF MISSOURI.

Three hundred and eighty-six years ago the third day of last August, there was a grand gala day at Palos in Spain. By the wishes of the good Queen Isabella, the courts of Castile and Arragon and the dignitaries of the Catholic Church, were assembled in that goodly city to pronounce a benediction upon Columbus and his three small ships, which that day sailed from this renowned port. These poor pinnaces, unseaworthy, badly manned and poorly equipped, turned their prows boldly out into the Atlantic, and for seventy-one days held their way into the vast expanse toward the setting sun, in search of the rich Cathay. As day after day passed by and favoring winds and currents bore them on into the vast unknown, a superstitious fear settled down like a pall upon the ignorant sailors. They believed the earth a broad expanse, bounded by precipitous edges. They saw in their fears the trade winds and the equatorial currents bearing them steadily on to the fatal verge, over which they would plunge down and down, into the fathomless abyss below.

But Columbus believed the earth a globe, and that he would find the east *under the setting sun!* The fearful sailors counseled a return before it would be forever too late. Columbus, with sublime faith in God and science, held a steady helm, and kept his course. The sailors plotted mutiny and threatened violence; but the intrepid leader kept his undeviating way, and on the morning of the twelfth day of October, planted the banner of Spain and the Church on San Salvador.

Thus ended the first great conflict between modern science and the church. The church taught that the earth is a *broad expanse* of land and water; but the dawnings of science declared it a *globe*. Columbus believed the science and conceived the idea of reaching China and the Indies by the west. He spent ten

years in trying to persuade the monarchs of western Europe to furnish means for the voyage. But their Catholic majesties disbelieved his science and doubted his ability to solve the geographical paradox of finding the *east in the west.*

But the good Queen Isabella gave him the ships and the doubting prayers of the church for his success and safe return.

His *failure* to find *China* became a grand success in finding *America.* It was a splendid triumph for both science and the church; as it gave a new continent to the church for its victories, and to science for its wonderful discoveries.

This conflict involved no important religious truth; but there is another conflict between some scientists and the church now waged with unparalleled ability and zeal all over the civilized world. In it are involved some of the vital truths of the Christian religion, and indeed, of all religions. It involves no less a question than the origin of man—whether he descended from a created Adam, or whether he must trace his ancestry back through a countless series of animals to an infinitesimal speck of self evolved sarcode.

The one is the teaching of the Bible, the other is the theory of Evolution. The one is the teaching of God's word; the other claims to be the indication of God's works. But the word and the works of the Creator must agree. If they do not agree both in appearance and reality, it is because we do not interpret the one or the other aright.

Some appear to think that this disagreement between some scientists and theologians is fatal to both science and religion; but they should remember that the expounders of natural laws and christian teachers are alike fallible men; that they often do make mistakes in their expositions of natural and revealed truths. We might illustrate our ignorance:

An ocean steamer is a little world in itself. The owner provides the power for running the steamer and all things needful for the comfort and safety of the passengers. Two philosophic flies happen on one of these steamers. They determine to investigate its nature and its laws. One fly goes down into the engine room and finds the water hot and vapory. The other fly investigates the dining table and finds the water cold and icy. There comes a grand conclave of the fly people; and the two investigators, big with the magnitude of their discoveries, come from the antipodes of the ship world and report. One reports his discovery of *water as cold as ice*, which the people drink; and the other reports his discovery of *water as hot as fire*, which makes the steam to propel the ship.

The first, positive in the fullness of his knowledge, loftily condemns the discoveries of his fellow worker as rank heresy, fraught with the most fearful consequences to the whole race. For, said he, if we drink his boiling water it will kill us all. The other replies with equal zeal and assurance, that the teachings of his co-worker are mere superstitious dogmas, fit only for the ignorant and vulgar. For, if water were cold it would make no steam, the ship would stop in mid ocean and involve all in universal ruin.

The flies take sides. The *cold water flies* and the *hot water flies* wage a bitter

contest, until some observer sees the water poured into the tea kettle *cold* and come out *hot*, and reports the fact that water may be both cold and hot. This proves both parties right and both wrong—both right in the facts reported, and both wrong in the conclusions drawn from an imperfect knowledge of water.

Thus we might expect ignorant flies to differ about the nature and functions of the outfit of a steamer. No less should we expect ignorant men to differ about the moral and physical laws of the universe.

Some men seem to think a difference of opinion involves a criminal neglect of truth and duty; that scientists, who announce truths or theories apparently conflicting with the interpretations of revelation, are heretical and pestiferous, inimical to the cause of truth and Christianity. But it is a remarkable fact that a larger part of the scientists thus condemned as hostile to the church, have been its devoted members; and many of the facts so vigorously condemned have been accepted as true by the church itself. Among these may be mentioned the astronomical theories of Galileo and Copernicus, and the geological conclusions of Conybeare and Murchison as to the age of the earth.

The theories thus far condemned have done very little injury to science or religion. A difference of opinion among the flies, could scarcely retard the progress of an ocean steamer; so the theories of men will scarcely mar the progress of nature or the faith of men.

Tyndall's denial of the efficacy of prayer, has scarcely checked a Father's care or lessened the number of devout worshippers. Every christian must feel for him as for an orphan, who knows no father's listening ear. And every one can but pity a man whose sublime *impudence* permits him to tell the hundreds of milions who *know* their prayers are answered, that they are deceiving themselves and bearing false testimony to their fellow men.

So every scholarly christian must blush with shame when he hears our christian teachers confound the *creating* and *making* of the glorious *Mosaic cosmos*, or in any way violating the acknowledged teachings of science and revelation.

But "*Development*," which you invite me to discuss, is no matter of recent origin; nor did it come fully developed like Minerva, all armed from Jupiter's brain. It has come in fragments from the brains of sundry speculators along the ages of the last three thousand years. But it was left for modern scientists to weave the parts into that ingenious system called *Evolution* or *Development*.

A history of the origin and progress of the various parts would be instructive; but it would consume my hour. I can only glance at the origin of some of the most salient features.

Epicurus, so far as I know, gave the first distinct declaration of the *spontaneous generation of animals* from the dust of the earth. This Grecian philosopher taught that the primitive earth, rich and nitrous and warmed by the sun, was soon covered with plants and that animals sprang spontaneous from the fat soil.

About the middle of the last century, M. Maillet published a *philosophic romance*, in which he made the ocean the source of the lower orders of organic be-

ings; and when the land appeared in the primeval ocean, these lower forms of plants and animals came trooping up from the teeming seas to populate the inviting shores. Flying fish became birds, and creeping things four-footed beasts; and some imaginary monsters, mermaids perhaps, became men.

In this author, we have the distinct *transmutation* of *species* announced in a form but slightly more reasonable than that in the fable of Deucalion. The change of fish into birds is a little more plausible than that of stones into men.

At the beginning of the present century, M. Lamarck and other French savans reasserted the theory of development and the transmutation of the lower animals into the higher, until all were produced by natural laws, without a Creator to give the vital spark and inspire the moral and religious nature of man.

But toward the middle of this century, *The Vestiges of Creation* appeared in England. In this famous work the ingenious author combined the *Nebular Theory* of La Place, by which the *Heavenly bodies* were evolved out of the primeval *star dust;* the *spontaneous generation* of Epicurus, by which the world was peopled with plants and animals; and the *Evolution* of Maillet, by which simple animals, that sprang like mushrooms from the fat primal earth, were developed into higher and higher orders, until the monkey became the man.

And all these wonderful miracles, these suspensions and violations of laws are accomplished by the laws themselves—by the powers of matter inherent in the primordial star dust.

These remarkable departures from the usual standards of doctrine in both the scientific and religious worlds, were so great and startling as to attract universal attention and to awaken much solicitude for the stability of those opinions, upon which had been based the world's progress in letters, philosophy, science and religion. Mankind had believed there could be no beginning or change of existence without an adequate cause. And yet this hypothesis of Development asks us to believe in a nebulous matter or star-dust, which filled all space, condensed around certain centers, assumed a rotary motion, and from time to time threw off masses which became systems, planets and satellites; that our planet was pregnant with spontaneous life; that sea-weed covered all the shores with gaudy colors; that myriads of protozoans swarmed in all the waters, and countless polyps reared their coral cities in all the shallow seas; that when the first dry land appeared, the first of living things came swarming out upon the welcome shore and were transformed, as each most desired, into creeping things, the beasts of the field, the birds of the air, and even into man himself; and that all these wonderful creations and transformations came with no creative power and no power to rule, save what was inherent in the original star-dust.

But the *Vestiges* contained a formidable array of facts and fiction, science and philosoply, reason and sophistry, to sustain its strange theories. The discussions which this work called out, were exceedingly able and so fully sustained the old standards of thought and reason that scientific men continued to believe in the creation and immutability of species, and the church-men in the Creator and the Genesis of Moses.

Some ten years later Mr. Charles Darwin published *The Theory of Evolution*, somewhat modified. He adopts the idea of Oken, that the first and lowest forms of animals were created; and from these simple primary animals, mere jelly-specks, all the higher orders were developed by *natural selection* and the *survival of the fittest in the struggle for life.*

Mr. Darwin has collected a vast array of facts from all departments of nature to illustrate his hypothesis. He presents the facts and arguments with great fairness and ability. Still he does not appear to feel his theory proved, but that the facts which sustain it far outweigh those which condemn it.

Many, especially English and American scientists, who reject the theory of Lamarck and the Vestiges, accept it as modified by Mr. Darwin, admitting the creation of the primordial animals. But the French more generally reject it. It is a remarkable fact that many Darwinians not only accept the theory of their great leader, but also the entire unadulterated system of the Vestiges.

There are other singular facts in this connection. While the young zoölogists and botanists of America accept the theory in its extreme form, the older geologists reject it, while the advocates of the theory appeal to the vast cycles of the geological record for proof, the geologists themselves fail to find any real proof in that record; while Tyndall and Proctor, who know but little of plants and animals and geology, accept development, Agassiz and Dawson and Hall, the first of all naturalists, especially in the departments upon which this theory rests, wholly reject it.

Having stated this epitome of the history and present status of the Development Theory, I propose to examine very briefly some of the arguments by which it is sustained, and to present a few of the objections to it; and to do this from a purely scientific standpoint. It must be borne in mind that science accepts no theory as proved, until it is shown to be in perfect accord with all important known facts of science.

Whatever may be the opinion of Mr. Darwin or any other individual, the real question at issue in this whole discussion, according to Drs Bastian and Child, Prof. Haskell, Mr. Herbert Spencer and Mr. Huxley, is whether all organic beings, all plants and all animals have been produced by the laws of nature without any supernatural creative power.

In this are involved two distinct questions:

1st. Whence came the first plant and the first animal? Epicurus says by the spontaneous generation of the earth. Evolution also says, by spontaneous generation. But Moses says, by creation.

2d. Whence came the first plant and the first animal of each species? (There must have been a first dog and a first horse and a first man as well as a first of all animals.) Evolution says by natural selection and the survival of the fittest. But Moses says, by creation.

Let us examine what science says on the spontaneous generation of organic beings and the evolution of species, by reviewing the leading arguments adduced to prove these hypotheses.

SPONTANEOUS GENERATION.

Many who believe in the spontaneous generation of animals, have been experimenting for many years to prove the theory.

Some thirty years ago, one Dr. Crosse announced his success; that he had evolved new animals by passing a galvanic current through certain solutions. These minute beings were all alike and were named *Acarus Crossii*, in honor of their creator. But alas! for human hopes! Dr. Crosse exhibited his experiment; and the little mites came trooping up the wires from the productive solution. But an observer recognized them as old acquaintances. They were the well known little *spiders, Acarus horridus!* and Dr. Crosse was compelled to step down from the high throne of a creator to the very humble seat of a *hatcher of spider's eggs!*

Several other experimenters have supposed they had succeeded in this new line of creation; but careful investigation has clearly proved that they had merely warmed into life the germs of pre-existing organisms.

So far, then, as science speaks at all on this subject, it says there is no such thing as spontaneous generation of organic beings, and sustains Harvey, that all living things came from germs or eggs, the products of parental beings—"*Omne vivum ex ovo.*"

Since, then, science has settled this question of spontaneous generation against Epicurus, Lamarck, Crosse and their followers, it only remains to inquire how far science sustains the evolution of one species from another.

EVOLUTION.

Various arguments are advanced to prove that evolution is the source of the higher orders of animals and plants. These arguments claim our careful attention, as upon the issues depend many opinions which mankind have held as sacred as household gods.

1. BY HYBRIDISM OR THE PRODUCTION OF HYBRIDS.

It is claimed that hybrids, as the mule from the ass and the horse become distinct species; and that the higher orders were thus produced by natural laws only.

It is well established that mules or hybrids are sometimes produced in both the animal and vegetable kingdoms; and that hybrids are like both parents in some respects and unlike both in others. But there are very many serious objections to hybridism as a mode of developing new and higher species of animals.

1. There are few if any instances in which hybrids are capable of perpetuating themselves. All the skill and science of men, incited by the hope of boundless gain, aided by the resources of nations, have been exerted in vain to produce a fertile mule. Man has exhausted all his resources for these thousand years; he has brought to his aid all the relatives of the equine family—the zebra and quagga from the wilds of Africa and the hemionus from the steppes of Asia, to aid his grand work in producing a fertile equine hybrid. But all in vain. All the hy-

brids prove barren *inter se.* The integrity of species is sustained—the creative fiat stands vindicated.

2. The hybrid is sometimes fertile with one or both parent species; but in all such cases the progeny loses the characteristics of the hybrid and returns to one or the other of the original species, thus barring all hope of a new species from such hybrids.

3. In the vegetable kingdom, it is well established, though disputed by some, that hybrids may be fertile. But it is clearly shown that the progeny of the hybrid returns to one or the other of the parent species; as proved by the seedlings of the famous Bartram Oak, from which it was expected a new species would be established.

4. It is admitted by all that hybrids seldom occur in nature; that nearly all well established cases, have been produced in the domestic state and by conditions forced upon the parents by the power and art of man. Such is the want of sympathy between different species in the state of nature as to preclude the production of hybrids under all ordinary circumstances of natural animal life.

5. If the 500,000 species of animals have been produced by hybridizing a few of the primitive species, nearly or quite all of them must have been produced in a state of nature; since they are older than man or at least contemporary with him, and could not have been produced by his aid.

6. Hybrids partake of the nature of both parents. They are seldom higher or lower than the average of the two ancestral species. No hybrid has shown the characteristics of a higher species or order. If then it were even proved that hybrids form new and permanent species, the higher orders could not have been thus produced from the lower primordial species.

There are therefore no facts to show it even possible to produce a carnivorous hybrid from herbivorous parents, none to show even the remotest possibility of producing a human hybrid from any two species of monkeys.

It is claimed by many that the various races of dogs were produced by hybridizing two or more species of native dogs. If so, the experiment has been a long one and under man's best care. But it has produced nothing but dogs; and no one expects it ever will produce anything but dogs.

An English scientific exchange, dated November 20, contains a report from a British observatory concerning the November meteors. It seems that from the morning of the 12th to the 15th there was a total absence of moonlight and the sky was cloudless, affording the best possible conditions for accurate observations. A constant watch was maintained and the meteors discovered were more numerous than in either of the last few years. The total number viewed was 309. Eighty-six were of the first or second magnitude, and nine others were brighter than first magnitude stars. The largest number seen during a single hour was fifteen, from 4 to 5 a. m. of the 14th.

ARCHÆOLOGY.

A BURIED RACE IN KANSAS.*

BY JUDGE E. P. WEST.

LADIES AND GENTLEMEN:—I have the honor this evening, of presenting to the Academy a report of some eqxlorations in Archæology which I have recently made on its behalf in Kansas.

The object of the exploration was to determine whether our Missouri Chambered Mound Builders extended their domain westward along the Kansas river valley and valleys of other important streams in Kansas.

The investigation has been as thorough as the time at my disposal admitted of, and I think has been sufficiently so to settfe the question involved, definitely.

With the exception of the mounds at Fort Leavenworth, described by the Rev. Mr. McCoy, in his history of the "Masonary work among the Aboriginies in Kansas," and perhaps a few others along the Missouri river, defining the Eastern boundry of the State, it may be safely assumed that the Chambered Mound Builders had no permanent abode in Kansas, or if so, have left no enduring monuments as evidences of it. But we must not suppose that Kansas is entirely destitute of pre-historic remains similar to some of those found in Missouri.

On the farm of Mr. Geiesa, near a small creek of the same name, a few miles west of Lawrence, fragments of pottery and stone implements are found very similar to those found on McGee creek, in this county, and on Jersey creek, in Wyandotte county, Kansas, south of the Missouri river, and the circumstances under which they are found are very like. There can be but little doubt that these vestiges, and those of Jackson and Wyandotte counties are synchronous, and the work of the same race, but differing from the race whose skill in chamber bnilding is so conspicuous in the chambered mounds in Clay and Platte counties north of the Missouri river. By the kindness of Mrs. Apitz, of Lawrence, and Mr. Geiesa, I was enabled to visit the ground, and I picked up several specimens of broken pottery and some stone implements, which I have placed in the cabinet of the Academy. I have two specimens of very finely finished arrow-points, picked up by Mr. Geiesa at the same place, which he was so kind as to loan the Academy.

In the vicinity of Junction City in Davis county, several mounds or rather stone heaps are found, containing human remains. I was enabled to partly examine some of these near the farm of Mr. Davis, editor of the Junction City *Tribune*, and through the kindness of that gentleman. We picked up on one of the mounds several fragments of a skulll bone and some pottery of the true basket type, but, unfortunately for the great antiquity of the mounds we also picked up a piece of a copper kittle, associated with the other fragments. These, by

* A paper read before the Kansas City Academy of Science, Nov. 25, 1875.

permission of Mr. Davis, I have placed in the cabinet, as also a flint arrow-point attached to the shaft, showing the mode of attachment; which was presented by Mr. Davis to the Academy.

Dr. Seymour opened other mounds of the same character near Junction City, which were described by him in the January number of the KANSAS CITY REVIEW OF SCIENCE AND INDUSTRY, of the present year. He, too, found associated with human bones and stone implements, pieces of thin copper, no doubt the remains of a kettle such as are used by our trappers and modern Indians.

Similar mounds are found in many places through Kansas, Colorado, New Mexico and Arizona, and are no doubt traceable to modern Indians and our early mountain traders and trappers.

Dr. Seymour was kind enough to point out some earth works, overlooking the Republican river, just outside the northern limits of Junction City, which were described by him some years back in the local papers. There can be no doubt but that they are the work of man, and may perhaps possess great interest to the Kansas antiquarian, and, with other similar works which may be found, certainly merit investigation as associated with the early expeditions and defenses of our pioneer traders, trappers and others who found their way into the boundless western wilds, a part of which is now dedicated to the progressive civilization of Kansas. But these works clearly cannot be associated with the Mound Builders.

At many places in Kansas stone arrow and spear points, stone axes and hammers, fragments of pottery etc., are found exposed upon the natural surface. Some very good specimens of which have been collected by Judge Adams, in the Historical Department at Topeka, and by private citizens in various parts of the State. Among the latter the most noticeable collection which it was my good fortune to see, was one made by Mr. Melvin Billings, of Marion Centre. This young gentleman has collected some very interesting specimens. As he was from home at the time I called to examine his cabinet, I had not the pleasure of seeing him, so as to ascertain under what circumstances his specimens were found. I have, since reaching home, received a letter from him in which he describes the size of his stone mallets or hammers as being "eleven inches in circumference and four inches long, on the average."

Many of the implements collected in Kansas, as for instance stone hammers, lie upon the boundary between the old and the new, and might be referred to the races of either, but in the absence of better evidence of their greater antiquity, should be referred, no doubt, to our modern tribes.

The pottery found, some of which wears the marks of great antiquity, may have been left by wandering or migrating tribes of Mound Builders, or what is very probable, has been found where deposited by a race of greater antiquity, by modern races, when exposed by the action of water, and taken for use or out of wonder or curiosity, and scattered over the country in limited quantities as found. I am not aware that other than a very limited quantity of pottery has accumu-

lated in any one place in Kansas. The buried vessels used by a prior race and subsequently washed out by successive changes in the river channels might afford sufficient material for all the fragments of pottery found in Kansas.

But, if evidences of a permanent abode of Mound Builders is wanting in Kansas, we have proof of a race of far deeper interest, if measured by its great antiquity. The wandering Mound Builders—if the fragments of antique pottery scattered over the plains of Kansas is to be attributed to them—little dreamed that they were treading over the remains of a buried race which had played its part in the great drama of life, and lay covered beneath the accumulations of the long Lacustrine epoch, embracing perhaps more than a hundred thousand years in the world's history.

The evidence is not meager or wanting in significance that such a race lies buried in Kansas. It is fitting, too, that Kansas, young and aspiring to all that is grand and noble—Kansas, great in her devotion to freedom and the rights of man—great in the fertility of her soil, and her agricultural resources; great in her railroads and industries, great in her boundless plains and fossil remains, should be the theater of such a race.

I must premise here, before entering upon the proofs of an extinct race, that prior to the Drift epoch, our river channels had a much greater depth and our valleys were lower than now. The old channels were filled by the Drift, and in some places changed by it. The valleys were subsequently filled by a Lacustrian deposit. It is in or beneath this that the extinct race lies buried, enwrapped in its profound mystery.

I shall ask your indulgence, if a fitting opportunity offers in the future, of presenting a paper on the Buried River Channels of Kansas in further elucidation of this subject.

The facts which I have to present are not as full and clear in detail as I could wish, but are sufficiently so to sustain the belief in a buried race. Human remains have been found covered up at various depths in seven different counties along or near the Kansas Pacific Railroad, namely: Douglass, Pottawatomie, Riley, Dickinson, Marion, Ellsworth and Lincoln. The remains, with one exception, have all been found in well digging, and on the second bottom or terrace of streams. At Lawrence, Douglass county, in a well sunk on Louisiana street, a rude flint implement was found by Mr. W. H. R. Lykins, of this city, some years back, at a depth of about twenty-eight feet, and described by him in the October number of the KANSAS CITY REVIEW OF SCIENCE AND INDUSTRY. The implement is described as being of an "irregular oval or leaf shape pattern, about four and one-half inches long and two and one-fourth inches wide."

On the Limerick farm, Sec. 9, T. 8, R. 9, on Rock creek, in Pottawatomie county, in digging a well Mr. Limerick informed me that some burnt clay, human bones, and arrow points were found at a depth of thirty feet below the surface. At Manhattan, in Riley county, at the confluence of the Big Blue and the Kansas rivers, in digging a well in the city, a small vessel of the true basket type

of pottery capable of holding about three pints was found at a depth of nine feet. It was in the possession of the late Prof. Mudge, whose sad loss is so fresh in our memories. He showed me the vessel and went with me to the place where it was found, and I have every reason to believe with him, that it could not have been covered in by the washing of rains.

On Chapman creek, in Dickinson county, in digging a well, a human skull was found at a depth of twenty-three feet below the surface. The clay, in or beneath which it was found, was compact enough to show the marks of the pick for several years after the work was done. The well was abandoned in consequence of the wife of the gentleman who owned the property being unwilling to use water from it because it contained human remains.

At Marion Center, Marion county, Mr. Billings, in the letter before alluded to, writes: "Among the things which you did not see are the bone instruments from cellars in town." I mention this in connection with the other facts, but it is probable that these implements have been covered in by washings from the adjacent hills.

At Ellsworth, in Ellsworth county, in a well dug on Main street, in the valley of the Smoky Hill river, I am informed by H. T. Hoesman, of that place, that the lower jaw bone of a human being, containing teeth, was found at a depth of twenty-six feet below the surface. Where found was about on a level with the present river bed, and five hundred yards distant from the foot of the hills bounding the valley on the north.

On the west branch of the Elk Horn river, in Lincoln county, I am informed by Mr. J. C. Ryan, that Mr. Thomas Wilson, in digging a well on his farm, in the south-west corner of the county, found three imperfect and one perfect arrow points at a depth of thirty-one feet. Fossil wood was found in the same well at a depth of eighteen feet.

We can hardly doubt the finding of human remains under the circumstances indicated, and we have a right to infer that they are buried in large quantities if we consider that the superficies of a well will not exceed twenty square feet or five feet square, and that there is upon an average, perhaps not more than one well to every square mile of territory in the counties named, or in other words, that the excavations made in well digging are as twenty square feet or five feet square to one square mile, or the 155,968th part of a mile's surface. We can hardly assume that chance has directed the wells dug where the only human remains are buried, not in one instance alone, but in six different counties.

The facts are sufficient to prove the existence of a buried race and that it must have been very numerous, for if the excavation of the 155,968th of a mile in six different counties, gave in each instance human remains, what should we infer would be the result if the entire territory could be excavated.

But where the evidence is deficient and greatly wanting in detail, is as to the time when this mysterious race lived. Was it before or after the Glacial period? Was it borne down by the glaciers and icebergs from more northern latitudes with

the drift? Or did it occnpy the valleys of Kansas after the Drift epoch and before the Lacustrine deposit? And if so, was it overwhelmed by the waters in which the Lacustrine deposit was precipitated?

These are questions which cannot be answered by the facts now before us and will have to await further developments. The most reasonable snpposition would seem to be in favor of the occupancy of the country after or during the Glacial period and prior to its last submergence, or that in which our Loess deposit took place. But while this is most probable, either of the other hypotheses may be true.

If similar remains should be found in the future it is desirable that they should be carefully saved, and the exact position in which they are found carefully noted. The local newspapers through Kansas wonld do a good work by urging this matter before the people. The grand results to the Archæology of Kansas which may follow would more than compensate the trouble.

Here we have a buried race wrapped in a profound and startling mystery—a race whose appearance and exit in the world's drama precedes stupendous geological changes marking our continent, and which perhaps required hundreds of thousands of years in their accomplishment. The prize is no less than determining when this mysterious people lived, how they lived, when they passed out of existence, and why they became extinct. Could they be recalled from their profound rest, they could tell us, perhaps, of the long, dreary glacial time, instinct with its irresistible forces, and of the deluge of our valleys with the inflowing of mighty volumes of water which buried all in their widely limited pathway.

I must not close without paying a merited tribute to the Kansas Pacific and the Atchison, Topeka & Santa Fé Railroads for the great interest they have always manifested in the development of Kansas, and for the facilities they have so generously extended for scientific investigation along their respective lines, embracing a district of country unsurpassed in fertility of soil, and richness, variability and grandeur of its fossil remains. I must, too, acknowledge the courtesy and aid everywhere extended me by the people of Kansas in my explorations.

THE GREAT PYRAMID—ITS GENERAL CHARACTER.

REV. JAMES FRENCH, DENVER, COLORADO.

There are thirty-eight of these peculiarly shaped, five-cornered monuments, arranged in groups and at comparatively short distances from each other. The Jeesah cluster is the most noted. Among these is the pyramid of Cheops, called the Great Pyramid, which stands preëminent over all others in age, magnitude and mechanism. But its special preëminence consists in its manifest purpose. In this respect it stands alone. All of the others are lifeless imitations, lacking the most distinguishing characteristics of this, just as a statue lacks a soul. If either of the others contained the symbols or coincidences which we find in this, we

should feel inclined to allow the Egyptians, as a people, more credit for what we discover here, and would say, with Dr. Field: "It is evident that they were able to measure the solar system as exactly as modern astronomers." (See From Egypt to Japan, p. 59.) But the Great Pyramid, though classed with many others, stands out unmatched, single in kind, and unequaled in character, the oldest and most perfect, first. Do man's works begin thus? Is it not invariable and in accordance with the law of his nature, always and everywhere, that he improves by practice and instruction? Is there not an acknowledged ascending scale with progress from the crude and less accurate to the more beautiful and correct in every work of the human species? This gradual advancement in knowledge and the mechanic arts is what distinguishes the species of animals called homo from those below us, which are guided by mere instinct. A bird builds no better or different kind of nest now than the bird of its kind did one thousand years ago. So of the bee. It is a wonderful little geometrician, but it is not so by practice or instruction. It never improves. But man does improve by both practice and instruction. This is his distinguishing characteristic, and is in accordance with a law of his being.

Now the Great Pyramid in this respect is unique, and presents this law of man's nature reversed; for his best and highest attainments are first. *It is a sudden presentation of approximate perfection in science and mechanic arts in advance of any known means of obtaining them, monumentally commemorated.*

Strabo, who saw it when complete in finish, with its beveled casing stones in their places undisturbed, before it had been mutilated by Musselman's polluted hands, declared "it looked as if it had descended upon its site really formed from heaven, and had not been erected by man's laborious toil at all."

Diodorus said "it seemed as if placed on the surrounding sand by the aid of some deity, rather than by the sole and gradual operations of man."

There is no more real resemblance between the Great Pyramid and the others than there was between Moses' rod and the rods of the magicians.

This distinction in kind is like that between the true God and the Egyptian mythological gods; or, like that between the true Christ and the Pagan mythological Christs; or, like that between the Bible and the so-called sacred books of the heathen.

We have waited patiently for an explanation of this peculiarity in this structure on some hypothesis which would not involve the absolute necessity of superhuman guidance in its construction. But this *unique* characteristic, by all critics, is ignored.

Mr. Edison finds that platinum, after it has been rendered homogeneous under the vacuum-treatment, is dissolved with great difficulty in boiling aqua regia. He subjected a specimen of the vacuum-treated platinum to the action of boiling aqua regia for five days without dissolving it.

GEOGRAPHY.

ANCIENT GEOGRAPHY OF AMERICA.

BY CAPT. E. L. BERTHOUD, GOLDEN, COLORADO.

We have before us a rare old work, dated 1597, which purports to be "a full and complete manual of ancient and modern Geography, modeled and made up in accordance with the geographical system of Ptolemy; its author, Antonio Magino Patavino, Professor of Mathematics in the Gymnasium of Bologna; printed at Cologne." It is, for that time, a very creditable work, and the maps are well executed.

Naturally, we have taken up that part of modern geography in which Patavino gives us the latest information concerning what he calls the "'*Novus Orbis*,' *dicta fuit* '*America*,' *ab Americo Vespucio Florentino.*" Again he says, "*A nonullis etiam Atlantica vocatur, atque etiam* '*India Occidentalis*,'" adding that the last name given to this new world is on account of the resemblance between its natives and those of the East Indies, in that they are nearly naked.

Patavino gives us, in his Geographical Manual, detailed maps of every country and kingdom in the then known world. His map to illustrate the text of his description of North and South America is a very fair approximate sketch of these two continents, but is not as complete as his first map, on page 29, which explains a chapter entitled "*Universi orbis terreni, secundum recentiorem nostri temporis rationem descriptio*"—a description of the whole terrestrial orb according to the most recent knowledge of our time. This map represents Europe, Asia, Africa and the Americas, with an Antarctic continent called "*Terra Australis nondum cognita.*" It is drawn with a perfection approaching that of Mercator, and is in size seven inches by about four inches. The Arctic regions show also in their whole extent a body of land divided into four separate parts. The two center parts are called Grutlandia, and the two other parts are called Terra Incognita. We notice, however, that the east end of Grutlandia is called "Nova Zemla." Evidently the discoveries of Barentz were unknown then to Patavino, and he was also ignorant of the existence of Spitzbergen, etc., etc., which go unnamed and unknown.

In the New World part, Hudson's Bay is distinctly shown, while the existence of a strait between North America and Asia is plainly and distinctly indicated. Our present territory of Alaska is shown on the map under the name of *Anian Regnum*, "the Kingdom of Anian," derived from the probable mythical account of the voyage of Maldonado from Baffin's Bay to the North Pacific—so long believed in the sixteenth and seventeenth centuries—who claimed to have discovered this northwest passage and the Strait of Anian. Oregon and Washington Territory are called by the name of Quivira, and Columbia River appears also, its

course from northeast to southwest being about what would be the average direction of Clark's Fork.

Geography is not always a progressive science, whatever claims we may make in this century that we have remodeled all geographical knowledge, whether ancient or modern. Patavino's manual well illustrates this, for we have in this map a very correct outline of the peninsula of Lower California, and of the great Colorado and Virgin rivers, the Colorado River shown as rising west of a range of mountains, evidently our Rocky Mountains, with another range west of them which well represents the general course of the Wahsatch and Uinta mountains. Now we have also in our possession an edition of Dampier's Voyages of 1702–4, and a still later edition of Shelvoke's Voyage Around the World, and in the maps of North America given in both of these works, California is shown as an island, while the Strait of Anian is placed in about the latitude of Queen Charlotte's Sound—a very complete retrogression from the time of Patavino. We shall again advert to other like changes.

Continuing east and south, we have Mexico under the name of "Hispania Nova." Florida is marked also, and appears to include within its limits Georgia, Alabama and Mississippi. The Mississippi and Rio del Norte are shown, but much abbreviated and nameless. Canada seems to be a river, possibly the Ottawa, while the Saint Lawrence is well delineated, the region north of it being called "Nova Francia," *i. e.*, New France, then a late acquisition of France and discovery of Jacques Carrtier. None of the Great Lakes appear, but a location in the interior is named "Chilaga"—query, "Hochelaga?"

If now we turn to the larger map of America, which, at page 278, represents only the New World, we see that the districts of North America now called Manitoba, Montana, Idaho, Dakota, Wyoming, Colorado, etc., are a vast blank, which has this legend on the map: "*Ulterius septentrionem versus hae regiones incognitæ ad huc sunt;*" that is, that this country, and the regions beyond to the north, "are yet unknown." This afterward was considered part of the "Great American Desert" (?).

In this map South America is represented as separated from a vast Antarctic continent by the *Fretum Magellanicum*, or Straits of Magellan, the land south of the strait being called as to-day, Tierra del Fuego, or "Land of Fire," Cape Horn, or the Straits of Le Maire, having been discovered only in the early part of the next century, 1615–18. Tierra del Fuego, however, forms but a small portion of the Antarctic Continent, which was then supposed to extend around the whole South Pole, and was called in that part which in modern maps includes Australia, *Nova Guinea*, or *Terr a Australis nondum cognita.* Patavino is here a little mixed up. In his small map, on page 29, he gives us New Guinea as an island, but tells us this is not yet a *settled point*, although he claims that it was seen by one Andrea Corsalus, a Florentine.

The part of the Antarctic Continent represented opposite Africa is called, in the small map, *Psittacorum Regio*, or the "Region of Parrots," a name given to it

by the Portuguese, he tells us, from the incredible number of these birds and their large size. We to-day cannot easily see how such an absurdity could have originated, unless we suppose that the early Portuguese navigators mistook penguins fot parrots. In the sixteenth century science had, at the best, but very crude ideas of the correlation of latitude, altitude and temperature. The anomalies of meteorology, time and temperature were almost unknown. Hence it is not at all surprising that, as late as 1734–1770, the existence of an Antarctic continent southeast of the Cape of Good Hope was carefully sought for by the French upon the reported discovery, in the sixteenth century, by one Paulmièr de Gonneville, of a temperate, semi-tropical country, where he landed after having been for a long time driven by storms in a southeast direction from the cape. He found, he said, a warm climate, a large river, and a population of dark-colored natives—who received him well—with such a vegetation that it plainly indicates that the imperfect methods of navigation of that period (A. D. 1508–10) had, by means of adverse winds and the currents, thrown De Gonneville on the shores of Madagascar.

(*To be continued.*)

GEOGRAPHICAL NOTES.

ARCTIC RESEARCH.

At a recent meeting of the Royal Geographical Society, Commander Beaumont, of the Nares expedition, read an interesting paper on the subject of future Arctic expeditions. He maintained that, in spite of the unfortunate controversies which followed the return of the late Arctic expedition, the discovery of the unknown world would never be permanently abandoned, and the Arctic regions, in common with the rest of the world, would surely be discovered and explored. He addressed himself chiefly to the question, Which route affords the best promise of geographical and scientific discovery? Franz-Josef Land seemed, at first sight, to fulfill the conditions required to insure success. Here the land extends far to the north, and, if any part of the shore could be reached by a ship, a sledging party might certainly attain to the 86th parallel. But the disadvantages of the route are, that it is uncertain whether a vessel could reach the land, while there would be no alternative after starting but to succeed or fail—if the main land were not gained, no lesser useful work could be done.

The next route, in his opinion, now that the Northeast Passage has been achieved, was the exploration of the land about Cape Britannia, proceeding by way of Smith Sound; that is, the discovery of the northern side of Greenland. He preferred this route to an attempt along the eastern side, because a higher latitude can be reached by Smith Sound, and believed that a vessel might winter on

the eastern shore of Robeson Strait, and advance depots to Repulse Harbor in the autumn. He had seen Cape Britannia, the most northern known point of Greenland, and believed that to stand on its highest peak would throw much light on Greenland geography. He then submitted calculations, derived from his own experience, of the time that it would take for a sledge party to reach Cape Britannia, and discussed the nature of the ice, concluding by offering several valuable suggestions for improved appliances in traveling over soft and deep snow.

AFRICAN EXPLORATION.

THE GERMAN EXPEDITION.

The German expedition under Gerhard Rohlfs has failed, and will probably have to be abandoned. This well equipped expedition, sent out by the African Society at Berlin to cross the Sahara at Wadai and go on to the Congo, left Tripolis in December last, passed through Sokna January 24, and arrived at the oasis of Jalo in April. Here further progress was checked by the hostility of the fanatical natives. Ever since the last Russo-Turkish war, perfect anarchy prevails in the province of Tripolis, where the Mohammedan brotherhood of the Snussi reigns supreme through terrorism. Their chief, Sidi el Madhi, issued orders to allow no Christians to go on to the southern oasis of Kufarah, and, though many natives are well acquainted with the road, Rohlfs offered one thousand Maria Theresa dollars for a guide in vain. Two attempts were made by the fanatics to stone him, and many of his servants deserted through fear. After six weeks' delay Rohlfs, with his companion, Dr. Stecker, returned to the port of Bengazi, on the Mediterranean, where, through the powerful influence of the German ambassador at Constantinople, they succeeded in obtaining from Ali Kemali, the new vali (governor) of the Cyrenaika, an escort of thirty Arabs of the Sulyah tribe, who, for the price of 1,500 Maria Theresa dollars, agreed to accompany the expedition through Kufarah to Abeshr, the capital of Wadai. On July 4 they left Bengazi and passed through Jalo for the second time, the baggage being carried by twenty-two camels. July 25 the expedition reached the oasis of Batifal, twenty-eight kilometers south of Jalo, and, after four days' rest, went on to the great Kufarah group of oases, which has never before been visited by Europeans. They crossed the intervening tract of sand-hills in ten days, and reached the northernmost oasis, Siren, and arrived at Istat, the capital of Kebabo, the southern group, in the middle of August. Rohlfs succeeded in thoroughly exploring the entire Kufarah oasis, but when about to continue the march south the expedition was set upon by the hostile natives and robbed of all baggage and possessions, the escort offering no protection, so that Rohlfs and Stecker were barely able to find their way back to Bengazi, where they remain at present. Though they expect an indemnity from the Turkish provincial government for their losses, there seems but little doubt that Rohlfs will abandon the expedition, as he has already once before sent in his

resignation. The exploration of Kufarah will, therefore, be the only result of this costly expedition.

THE THREE BELGIAN EXPEDITIONS.

The three Belgian expeditions of the International African Association at Brussells have, meanwhile, succeeded in making better progress. The first expedition, under Lieut. Cambier and Dr. Dutrieux, which left Bagamoyo, on the Zanzibar coast, in July, 1878, after passing the entire rainy season at Tabora, the Arab capital of Unyanyembe, has now gone on to Lake Tanganyika. Dr. Dutrieux, however, returns to Zanzibar on account of differences with the leader.

Expedition No. 2, under Capt. Popelin and Dr. Van Henwel, who started from Brussels in April last, was organized at Zanzibar by Henry M. Stanley, and left for Bagamoyo June 28. Twelve days later it started for the interior by Stanley's old road. While crossing the Makata the leaders suffered much from fever, but after reaching Mpwapwa, August 10, they rapidly recovered.

The third expedition left Dar-es Salaam, on the coast, July 2, accompanied by the four elephants presented to the expedition by the King of Belgium. These animals were brought by steamer from Bombay to Zanzibar and landed, June 1, in the Msasani Bay, near Dar-es-Salaam. They are employed as carriers, each elephant carrying 4,000 pounds of goods. Great fear was entertained that they might succumb to the bite of the dreaded "tse-tse" fly, which kills all other animals of burden; but they have since passed through the districts infested by this insect, and, though well bitten, have shown no bad results therefrom, thus proving the experiment of employing them in the service of African exploration a great success. They crossed mountains, streams, swamps and gulches with ease; but their native Indian mahouts suffered severely from fever. This expedition arrived a few days after the second party at Mpwapwa, where both combined, and on September 2 continued their march west. At Ujiji, on the Tanganyika, all three Belgian expeditions will effect a junction.

No later news has arrived from

THE FRENCH AND ENGLISH MISSIONS ON LAKE NYANZA.

The French expedition, under Abbé Deblaize, reached Ujiji on April 2 last, 250 days from the coast, and intended to go on through Manyuema to Nyangwe, on the Lualaba-Congo. The English expedition, under Keith Johnstone, has not disbanded in consequence of the sad death of its leader, which occurred June 28, after twenty days' illness, of dysentery, at Berobero, in Kutuland, 150 miles southwest from Dar-es-Salaam, from where the expedition started May 14. Mr. Thompson, the geologist of the expedition, has taken command, and gone on through Uherge to Lake Nyassa, where he is probably busy at present exploring the north end. From there he intends crossing the unknown regions to the south end of Tanganyika, returning by way of Ujiji and Unyanyembe to the east coast. Keith Johnstone, before starting from Zanzibar on his ill-fated journey, made a

short trip into Usambara. He did not reach the capital, Tuga, but plainly saw the town from the Handei hills, and by his estimate places it nearly twenty-five miles northwest of the position assigned to it by Burton and Speke twenty years ago.

The missions in the lake regions have not progressed very favorably thus far. The Church Missionary Society's station, under Rev. Mr. Wilson, at Rubaga, King Mtesa's capital, on the north shore of Victoria Nyanza, was reinforced early in the year by three additional missionaries, who went up the Nile to Uganda. King Mtesa treated the mission well, and, owing to their representations, even abolished slavery in all his dominions. Recent advices state, however, that he has turned unfriendly and suspicious on acount of the near approach of the Egyptian advanced posts to his frontier, which he attributes to the mission's complicity. Still he has allowed two of the members to go with some of his messengers to Col. Gordon to protest against his advance. Mr. Felkins reached the Egyptian post Fatiko in May last, while Mr. Wilson was still on Uganda territory June 26, accompanied by four chiefs. Two other members have been permitted to go to the south shore of the lake to send up some stores, which arrived there from Zanzibar, and the remaining three missionaries are still at Mtesa's court under surveillance.

After the death of Rev. Mr. Thomson, the head of the Tanganyika mission, at Ujiji, in October last, the London Missionary Society sent out Dr. Mullens, its former secretary, to reorganize the mission. He reached Mpwapwa, on the road to the lake, and there suddenly died, July 10, of peritonitis. His companion, Rev. Mr. Dodgshun, went on to Ujiji, but, seven days after his arrival there, he also fell a victim to the murderous climate. Since then the Society has received no news from the surviving members of the station, Rev. Mr. Hutley and Mr. Hore, the naturalist, and has, therefore, asked Dr. Laws, the chief of the Livingstone station on Lake Nyassa, to send trustworthy native messengers to Ujiji and bring back letters.

The Catholic mission, under Father Livinhac, arrived at Kaduma, on the southwest shore of Victoria Nyanza, in January last, and two of its members went in boats to Uganda to obtain King Mtesa's consent for founding a station in his country. Meanwhile the reinforcements for the Catholic mission at the lakes sailed from Algiers June 29 for Zanzibar. They comprise twelve missionaries and six former Pontifical zouaves of German, Scotch and Belgian nationality.

ITALIAN, SPANISH AND PORTUGUESE EXPEDITIONS.

The Italian expedition to Southern Abyssinia, under Capt. Martini, sailed from Leghorn in March last, and arrived at the port of Feila, on the Red Sea. Here they were unable to procure means of transportation, owing to the Emir's hostility, so that Capt. Martini was forced to abandon his projected expedition to Shoa and Central Africa, and returned to Civita Vecchia by the steamer Rapido on August 3. The Marquis Antinori has meanwhile pushed on far to the south-

west, beyond Kaffa, but nothing positive is known as to his whereabouts, and rumors of his death have come in.

The Portuguese, on the west coast, have also failed to accomplish much. The expedition under Lieuts. Ivens and Capello were on the banks of the Luculla, a tributary of the Quanza, in April last, and explored the Cubango region, following down this river from its source to the eighth degree of latitude. On July 24 they arrived at Dugue de Braganza, a military post on the Upper Luculla, destitute of means for proceeding further. The government has since forwarded fresh supplies, and by the latest accounts the explorers were at Golungo Alto, in the province of Angola, on their way back to Loanda, on the coast, where they were expected to arrive in December.

Major Serpa Pinto, the leader of the Portuguese expedition which crossed Africa from west to east in 300 days, is at present very ill at Brussels, where he represented his government at the International African Conference. The publication of his book will, therefore, probably be delayed. Its title will be "The King's Rifle, from the Atlantic to the Indian Ocean, Through Unknown Countries, and the Discovery of the Great Zambezi Tributaries." It is to be published simultaneously in English, French, German and Portuguese, and will contain many engravings and fifteen maps.

A new Portuguese expedition has just left Lisbon for the east coast. Lieut. Pavia de Andrada, with a staff of several engineers and a physician, has been sent out by his government to Mozambique to make new surveys of the Zambezi River and establish trading stations on the old sites of Tete and Zumbo, on that river, and the westernmost posts of the Portuguese, but which have been abandoned for years. For this purpose the expedition has received a twenty years' prerogative on all minerals to be discovered, and on the woods, as well as a grant of 100,000 hectares of land from the government.

The Spanish expedition, which the Geographical Society of Madrid sends out under the leadership of Señor Albergues, will be the first one of that nationality taking part in African exploration. The expedition will, on its way to Central Africa, take along presents from King Alfonso for the kings of Abyssinia and Shoa, through whose dominions it intends to pass. The Prince hereditary of Monaco will be a member of this expedition, which he joins at Marseilles.

NEW EXPEDITIONS.

The Russian traveler, Dr. Junker, who has already made extensive explorations in the White Nile countries, is at present in Berlin, making preparations for a great expedition by way of Egypt to the Soudan and the Monbuttu country, where he intends to continue Dr. Schweinfurth's researches among the Niamniam cannibals and the Acka dwarfs, and, if possible, cross the Welle River.

Dr. Oscar Lenz, the explorer of the Ogowai, has again been sent out by the African Society at Berlin, to explore the unknown parts of Morocco, there to become acquainted with Mohammedan manners and language and then go on to the Soudan. He left Vienna last month for Tangiers.

The French traveler Soluillet, who recently failed in his attempt to reach Timbuctoo, will be sent out by his government to explore the Sahara between the fifteenth and twenty-fifth degrees of north latitude, in connection with the grand project for connecting the French colonies at the Sinegal with Algiers by an overland railroad.

Dr. Emil Holub, who has just returned to Europe from seven years' explorations in South Africa, which took him to the Victoria Falls of the Zambezi and beyond that river, intends to form a new international expedition, with twelve members of various nations, for further explorations in Central Africa.

The Germans, on the west coast, have accomplished some valuable work. Engineer Otto Schutte has returned to Berlin after a successful expedition, in the course of which he followed down the Cassai River, one of the Congo's great affluents through unknown regions to the sixth degree of south latitude. He had penetrated within two days' march of the great cataracts, when he was stopped by the native King Mai. The Cassai was then known by the Congo's old name, Zaire. The Sankorra Lake was said to be near the fifth degree. The natives call it Mucaruba, and say its south shore is inhabited by dwarfs. Mr. Schutte went on to the Mwata Yanoo's capital; but here, like his predecessor Pogge, he was prevented from going further and had to return to Loanda. The German African Society has received no later news from its other explorers—Dr Buchner, who has gone up the Quanza to take the German Emperor's presents to the Mwata Yanoo, and Major Mechow, who attempted to ascend the Quanza and return by way of the Congo.

Donald McKackenzie has succeeded at last in establishing his trading station near Cape Juby. He settled eighteen men in the wooden houses brought from England and set up near Port Victoria, and has come back for more settlers and fresh supplies. Sheik Mohammed Beyrout, the ruler of that district, is very friendly and desires to trade with the station.

IN THE UPPER NILE REGIONS

the change of the Egyptian ruler and Col. Gordon's abdication will necessitate a withdrawal of the far advanced posts and a change of the southern frontier. The slave trade in the White Nile country has now been completely stamped out by Gordon and Gessi. Mr. Bohndorf, Gordon Pasha's valet, claims to have penetrated far beyond King Mofio's territory west of the Dar Fertit. He crossed the Bahr Shimko flowing west, but after six days' march further he was forced to turn back by the cannibalism of the natives. He heard therethat the country southwest of Mofio's is called Dar Tikma, and that a large river, named Umbomo, flows through it to the west.

Mr. Duchta has just returned to Chartum, after passing last winter in Unyoro and Uganda, where he succeeded in taking a great number of photographic negatives of the scenery and the natives.

Dr. Enim Effendi has sent in a complete account of his expedition through Unyoro to King Mtesa's capital.

Dr. Schweinfürth, since finishing his map of the Fayoum, is now at work on a new chart of the Arabian Desert in eastern Egypt, on a scale of 1: 200,000, based on his own explorations and those of his predecessors.

THE AFRICAN ISLANDS.

Col. Austen has been sent by the British government to the Island of Socotra, at the entrance to the Red Sea, to make a thorough exploration of this new possession.

The German geographers, Drs. Greef and Gesser, are at present employed in visiting the western African islands—Azores, Madeira and Canaries Dr. Hillebrand is exploring the still unknown portions of central Madagascar, as successor to Dr. Rutenberg, who was murdered last year by the natives.

A settlement has recently been formed by forty Norwegians on the small Aldabra Islands, thirty miles north of Madagascar.

THE NORTHEAST PASSAGE.

The expedition sent by the Russian government at the beginning of the present year has just returned to St. Petersburg. This expedition was dispatched to the mouth of the Obi, under the direction of Captain Moisejeff, of the Imperial Navy, as soon as the sea passage to the Siberian rivers had been proved to be practicable by Professor Nordenskjold, Captain Wiggins and others, and its object was to investigate the river mouths, lay down signs and generally render navigation as convenient and safe as possible. Captain Moisejeff took his steamer down the Obi from Tobolsk to the mouth of the small river Neda or Nadym, where steamers generally load and discharge their cargoes, and from that point made his preliminary investigations of the difficulties and requirements of navigation in the, comparatively speaking, newly opened water way. The results of his investigation he is now embodying in a report. It is strange, he says, that of eight steamers, mostly English, which have attempted this year to pass the Kara Sea, only the Louisa, a Russian steamer, has apparently succeeded in the enterprise. Next year it is proposed to send a much larger expedition to complete the laying down of signs and to establish the custom house regulations.

NORDENKSJOLD'S REPORTS.

The following scientific papers have been received by Mr. Oscar Dickson at Gothenburg, from the members of the exploring party who have accompanied Professor Nordenskjold, and will shortly appear in print: "Of the possibility of Trading in the Siberian Arctic Seas," by Professor Nordenskjold, and dedicated to the King of Sweden; "Of the position of the Aurora Borealis in Space," and "The Habits and Customs of the Tschuktschers," by the same; "Dictionary of

the Tschuktschers' Language," by M. O. Nordkvist; "Studies on the Sense of Color of the Tschuktschers," and "Lichnologic Researches on the North Coast of Siberia," by M. E. Almquist; "Of the vegetation of the Algæ in the Siberian Arctic Seas," and "Of the Vegetation on the North Coast of Siberia," by M. F. R. Kyellman; "Of the Fauna of the Invertebrata in the Siberian Arctic Sea," by M. Anton Stuxberg. Several of these papers are accompanied by drawings, illustrations and charts showing how hard and conscientiously the explorers have worked.

DEATH OF A YOUNG EXPLORER.

According to telegraphic information received by the Secretary of the Navy, at The Hague, Mr. L. R. Koolemans Beynen, the young lieutenant in the Dutch navy who had already established a great reputation by his exertions to forward the Arctic explorations, was "killed by accident" (unknown yet of what nature), on board of Her Majesty's steamer Macassar, then on a cruise in the Borneo waters. Mr. Beynen's first voyages to the Arctics were on board the Pandora, under the command of Sir Allan Young, which competent judge always speaks of him in the most laudatory way. On his return to Holland it became his most cherished object to have again the Dutch flag float in those regions which had formerly been so familiar to it, and chiefly by his personal enthusiastic representations, backed by a few other champions for the Arctic cause, he carried his countrymen to his point, and on his initiative the Willem Barentz was built and a truly national expedition to the Polar Seas got up. The results of the two expeditions which this vessel made, under the command of Lieutenant de Bruyne, are already well known to you. On her first trip, in 1878, Mr. Beynen was one of the officers, and he would have been but too glad to join the second had he not been transferred to the Dutch East India squadron.

ARCTIC EXPLORATION.

BANQUET TO PROFESSOR NORDENSKJOLD AT NAGASAKI.

A grand banquet was given to Professor Nordenskjold at the theater on the evening of the 22d of October. Mr. Mangam, the United States Consul, presided as Doyen of the Consular Corps. Opposite to him was the famous explorer Mr. Olarovski. The Russian Consul presided at one end of one of the long tables, and Dr. Salter of the Government School of Nagasaki, presided at the other, assisted by the stewards of the evening, gentlemen representing ten different nationalities at the port. There were eighty-eight guests, and speeches were made in eight different languages The room was profusely decorated with flags of all nations and a profusion of the beautiful evergreens and flowers of Japan. Admiral Patterson, of the flagship Richmond, kindly loaned the band for the occasion, and the affair was a great success. The speeches were delivered in Norwegian,

Swedish, German, Dutch, French, Japanese, Chinese and English. The toasts and speeches were as follows:

1 "The Crowned Heads and Presidents of all the Nationalities," by Mr. Magnum, United States Consul.

2. "Professor Nordenskjold," to which the explorer replied in Swedish.

3. "Captain Polander and the Members of the Expedition," by Mr. Rocher, Acting Consul for Sweden and Norway. Mr. Rocher spoke in German and Captain Polander, of the Vega, replied in English.

4. "The Promoters of the Expedition," by Mr. Flencker, Consul for Denmark. Mr. Flencker spoke in Norwegian.

5. "The Army and Navy of the different Nationalities," by Dr. Salter. Captain Benham, the commander of the Richmond, replied.

6. "Professor Nordenskjold," by Mr. Won-Ven-King. Mr. Won-Ven-King spoke in Chinese, and his speech was translated into English by Mr. Leong, the interpreter of the Chinese Consulate at Nagasaki.

7. "Professor Nordenskjold," by Mr. Segar, late Secretary of the Japanese Legation at St. Petersburg.

8. "Previous Expeditions to the Arctic Regions," by Dr. Fock, of the Imperial Japanese hospital at Nagasaki. Dr. Fock spoke in Dutch.

9. "The Geographical Societies of the World," by Mr. Olarovsky, Russian Consul. Mr. Olarovsky spoke in French, although he is at home in many tongues

Mr. Olarovsky proposed the health of Captain Aldrich, of the Sylvia, Her Britannic Majesty's gunboat stationed at Nagasaki. Captain Aldrich was lieutenant of the Discovery, the companion ship of the Alert, of the Nares expedition, and has the credit of having gone nearer the arctic circle than any other navigator. Mr. Olarovski's speech was in English, and Captain Aldrich's reply was brief but excellent.

The invitations in front of each guest's plate were etched in water colors, with appropriate views of Arctic scenery, the work of a Japanese artist, from designs furnished by the committee. The drop curtain represented the ever glowing Fugiama, the glory of Japan, and a view of the ever beautiful Setouchi, the inland sea of Japan. I do not think that New York, London, Paris, Berlin or Vienna could have exceeded the taste displayed in the whole affair. The assemblage was polyglottal, and this gave a picturesqueness to the scene.

COMMANDER CHEYNE'S PROPOSED EXPEDITION TO THE POLAR REGIONS.

Commander Cheyne, R. N., delivered on the 20th ult., a lecture in the City Hall at Glasgow, on the subject of his proposed Polar Expedition. Sir James Bain, who presided, said, in introducing the gallant commander, that there had been already a meeting in Willis' Rooms, London, on the subject, at which a proposal was made by Mr. Puliston, M. P., seconded by Mr. J. Newton, C. E.,

President of the Association of Foremen Engineers and Draughtsmen, and carried, to the effect "that in view of the completion of the northeast passage by Sweden and the entry by other nations into the arena of Arctic exploration, it is necessary that a new British expedition be immediately organized to act in concert with the expeditions of other nations for general scientific results, and to honorably compete with them for the discovery of the North Pole; that such expedition shall consist of one steamer, having balloons as a recognized portion of the equipment, at a total expense of thirty thousand pounds, to be raised by public subscriptions throughout the country." Another resolution had been adopted inaugurating the London Central Arctic Committee for England, of which Dr. Cameron, member for Glasgow, had since consented to become a member as a representative for Scotland. Commander Cheyne, who was received with applause, said that it was with untold satisfaction that that morning he had again crossed the Tweed to the land of his forefathers, which had led the way in Arctic exploration. He had so applied the spur to England through Scotland that he hoped he had dragged her to the front, and when Scotland had once taken a thing in hand it was not within the scope of the Scottish character to withdraw. We all now acknowledge that it would be a great disgrace to this nation if, after the partial failure that had lately taken place—a failure in some things, but a success perhaps in others—we should sit down quietly in our rooms and cry *peccavi*, and wrap ourselves up in blankets and say "we are beaten." Such was not the course pursued either by the Duke of Wellington or Nelson, and such would not be the course pursued by any leader or leaders in our country as long as Scotch and English blood circulated through them. The Canadian, Sir John McDonald, had promised support to the expedition, and Sir Leonard Tilley, Minister of Finance for Canada, had said to him: "If you break down in this country for want of funds, come to Canada and I think we can do it for you ourselves." He didn't want Canada to do the work herself. He wanted to unite the two countries and to form a British-Canadian expedition with good strong Scottish help.

The gallant commander then, with the aid of the magic lantern and dissolving views, described graphically the vicissitudes an expedition has to go through in its voyage toward the Pole, according to his own experience. Alluding to the last exploration, he remarked that it was not the want of lime juice on the sledges that had broken down the crew, but the keeping the men between badly ventilated decks and not allowing them fresh air. Much information he imparted about the oceanic currents and the nature of the ocean's bottom, the latter taken from the soundings of Her Majesty's ship Valorous, in Davis Strait and the Atlantic Ocean. The route he proposed to take—on the ship fitted out for Captain Nares' last expedition, which he intended to ask from the government—was by Barrow Strait, Wellington Channel, through Queen's Channel, where he will winter on the station gained by Captain Nares, and thence into the unknown by means of sledges and balloons, in a north-northwest course to—not toward—the Pole. Among the views he exhibited were sketches of the remains, as first found, of graves of

the seamen belonging to the Franklin expedition in Beachy Island, and a capital portrait of Sir John Franklin. While these were passing through the lantern Mr. Cornwall played in magnificent style on the organ "The Dead March in Saul," and Commander Cheyne afterward remarked that if they could only throw as much spirit into the British public as the organist had thrown into the march we should soon have the North Pole discovered. Having described the method of his intended ballooning enterprise, and brought the good ship back into Portsmouth, he closed his admirable lecture by showing a portrait of the Queen, and said there appeared to him but one jewel wanting in the crown of Her Majesty, and that was the British colors flying at the North Pole. We did, he owned, want to annex more territory, but only to take it from the Polar bears, and there would be no heart-burnings over that. He hoped that we should yet be able, figuratively speaking, to create Her Majesty "Queen of the North." (Loud applause.) Before concluding he reported what support he had met with in England, what was intended to be done in Ireland, and hoped the Central Committee already formed in Glasgow would work well, and trusted that Scotland, having come by herself to the front, might reap the reward of her enterprise. As for himself, he had pledged his word as a Scotchman to do what he could to accomplish the discovery of the North Pole.

MARKHAM'S RECENT VOYAGE.

At the last meeting of the Royal Geographical society, Lord Northbrook presiding, a paper by Captain A. H. Markham, who is not in England at present, "On the Arctic campaign of 1879, in the Barentz Sea," was read by the honorable secretary. Captain Markham considered that the present year must always be regarded as a very remarkable one in the annals of Arctic exploration, for during the last few months two important geographical problems had been successfully solved. The Swedish ship Vega, under the leadership of Nordenskjold, completed her voyage from the Atlantic to the Pacific by rounding the northern termination of the Old World—a voyage which even if it should not prove important in a commercial sense, would always rank as one of the greatest geographical feats of the present century. And secondly, a small sailing schooner had reached the hitherto inaccessible shores of Franz Josef Land. He said inaccessible because the Tegethoff, the only vessel that had ever approached this coast, had been carried thither by the ice in which she had been helplessly beset for two years, an imprisonment from which her officers were never able to extricate her. The vessel that had so successfully accomplished the latter feat was the little Dutch exploring schooner Willem Barentz. His own cruise this year, although undertaken in only a little sailing cutter of forty-three tons burden, was, as far as it went, perfectly successful and had tended very materially to strengthen his previous opinions that the route by Franz Josef Land is the one that will lead to the discovery of the greatest extent of previously unknown country. Though

successful in a geographical point of view, his trip wou'd have been more so had it not been for the unwillingness evinced by the Norwegian crew to face the ice. The conception of the cruise was entirely due to their newly elected associate, Sir Henry Gore Booth. Early in the year he gladly accepted Sir Henry's invitation to accompany him on a sporting trip to Novaya Zemlya, with the understanding that they should afterward examine the ice in the Barentz Sea and other localities, during what he considered to be the navigable season—namely, the month of September. For their cruise he had hired the little Norwegian cutter Isbjorn, already rendered historical by her exploits under Payer and Count Wilczek. He could not help strongly expressing his opinion regarding the employment of vessels unprovided with steam power in exploring the icy seas. At the very moment when the ice is more open than at any other time—namely, in a calm, a sailing vessel is perfectly helpless, and at other times, when there is a fair wind through the pack, it would be imprudent for a commander to run on, because to extricate himse'f from the ice he would have to work to windward in an ice-blocked channel. Although most successful work had been accomplished in the Arctic seas by sailing ships, there was no doubt that had those vessels been steamers much more would have been achieved. Yet this year we had an example of a small sailing vessel not only reaching, but also returning from, a country which a steamer approached, in 1873, by being helplessly drifted in the ice, only to leave her timbers bleaching on the shore There was little doubt that had the Willem Barentz possessed steam power she would this year have made one of the most brilliant and successful summer cruises in the Arctic seas ever recorded. It was only by perseverence that success could be command-d in the Arctic seas. He would now propose that a vessel (and one was quite sufficient), should be sent out to Franz Josef Land prepared to winter. Should the season be unfavorable, and the vessel be unable to reach her destination, the commander ought to be instructed to return to England and be sent out the following year. But from a comparison of all the voyages which he had enumerated, he was inclined to think that a steamer would have no difficulty in reaching the south coast of Franz Josef Land during the last week in August or during the first two weeks in September.

ASTRONOMY.

NOTE ON JUPITER'S SPOTS.

BY PROFESSOR C. W. PRITCHETT, MORRISON OBSERVATORY.

EDITOR OF REVIEW: As the paper of Mr. Dawson in your November number contains a notice of the very remarkable rose-tinted spot on Jupiter, allow me to say, I have made a large number of observations of the transit of this spot over the central meridian of this planet. In advance of the full discussion of these ob-

servations, relatively to the aërial rotation, and other physical phenomena, one very notable fact may be deduced from them. I will state it disjunctively. Either the spot has retrograded since August 6th, through 21° of longitude, or the received value of the planet's rotation (9.92 hours), is too small. Has this singular elliptical cloud an actual motion of translation on the Jovian surface? This is a question of profound physical interest, and can only be answered (if it can be answered at all), by close and patient observation. I have invoked observations, directed to this end, from astronomers in our own country and in Europe. Having tried to do something myself in this direction, I find the spot to keep its place well relatively to certain gray triangular and notched masses in the south—preceding quadrant of Jupiter; while the varying spots and cloud masses between the two great equatorial belts have been observed to change place very rapidly relative to this spot south of them. Some of them have been observed to move in the space of three days, along the whole length of the spot. There seems to be strong evidence that the region of great activity (visible to us), or of visible motion of translation on the Jovian surface is within the equatorial zone, and that the spot is so far south of this zone as to be unaffected by it. If, however, this spot has an actual motion of translation, it must be in a direction contrary to that of the middle zone. Jupiter is now so far past apposition that observations made during the next few weeks can not be so valuable as those made a few months ago. But the spot having now lasted more than seventeen months, it is to be hoped that it can be observed through another apposition. In form, size and color it still maintains a surprising persistency. Astronomers are anxiously watching how it will break up or disappear.

PROF. TICE ON THE METEORS OF NOVEMBER 13, 1879.

We are permitted to publish the following letter from Prof. Tice to a gentleman of this city explaining the absence of meteors in this locality on the evening for which they were predicted.—ED.

LE GRAND, IOWA, November 24, 1879.

MR. H. F. BUNGARDT, Dear Sir: Yours of 14th, forwarded to me at this place, just received. There are perhaps seven or at least six fixed periodic showers of meteors. Namely: April 20th to 25th, August 10th to 17th, Nov. 6th, to Nov. 12th, Nov. 13th, Nov. 27th and Dec. 6th to 9th. Of these that of the 13th of November is generally the most brilliant and of shortest duration, being only seen between 1 and 5:30 a. m., while the other displays are visible nearly if not quite all night.

I have examined all meteoric showers recorded in history, or the legends of them delivered by tradition for the last 3700 years, and I have not found one that is not comparatively local, covering not more than twenty degrees of longitude, but ninety or more degrees of latitude, as they have been seen from Greenland on the north to Rio Janeiro on the south. The *Chicago Times* of the 21st instant

states that "parties in Indiana declare that there was a good display between 3:30 and 5:30 in the morning of the 13th. Prof. Dawson, the self-educated astronomer of Spiceland, saw quite a number, and the principal of the High School at Washington counted one hundred and ninety of them."

Assuming that the average breadth of the shower east and west is twenty degrees, our chance of seeing them is only one in nine, though there always is a sporadic distribution of broader extent. Those seen in Indiana and elsewhere in this country no doubt were sporadic, and the shower occurred elsewhere, probably in the Pacific Ocean. As those that occurred forty-six years before 1833, namely, in 1787, occurred in Eastern Europe, extending westward to Central Germany, and those in 1833 from the east coast to the center of North America, the shower this year may have occurred as much westward, say over the Pacific Ocean. I have hopes that they will yet be heard from.

As to my theory as to the cause of these meteors, it was arrived at inductively. Making allowances for the sun's translation through space, it will be found that the showers occur at the nodes of the planets, that is, where their orbits intersect the orbit of the earth. The solar apex or the point whither the sun, with his companions—the planets, is flying, is somewhere between 237° and 260° heliocentric longitude. Hence the earth may intersect both the ascending and descending nodes of all the interior planets and the descending nodes at least of Mars and those of the planetoids. The nodes of Jupiter, Saturn, Uranus and Neptune are probably too remote from the solar apex.

The meteors of April 20th to 25th occur at the descending node of Mars. The orbit of the earth where she is in August, is intersected by a very large number of the planetoids. The meteors of 6th to 12th of November occur at the descending node of Venus, those of the 13th at the ascending node of Mercury, those of 27th at his descending node, and those of December 6th to 9th at the ascending node of Venus.

It should be stated likewise, that the earth crosses her own orbit about the 25th of November, and this may be the cause of the meteoric shower from the 24th to 28th.

The Zodiacal Light seen in the east before sunrise until the 20th of November, after the 28th appears in the west after sunset. I hold that the luminous section of an arc known as the Zodiacal Light, is the path of the earth's orbit through space, marked by the gases left in her track. These gases may cause the meteors at this date.

Astronomers both in America and Europe are confident that a meteoric shower will occur about the 27th, I, however, think it very doubtful. Their theory is based upon the assumption that a comet that disappeared nearly thirty years ago lost its tail, and that this tail is still wandering through space to find the body. Hence it pursues the path the body would have done had it persisted. We have heard of and seen comets without tails, but no tail without a comet has yet been seen. In fact, the tail, it is well known, only develops and enlarges

until the comet has passed its perihelion, when it rapidly decreases and entirely disappears long before the comet itself does, in the far off realms of space. It is the same phenomenon as the tide on the far side of the earth when the sun and moon are in conjunction. That is, it is the effect of electric repulsion. That this is the case is evident from the fact that the tail of a comet always projects on the side away from the sun. For this reason I take no stock in comet tails without bodys, as causes of meteors. A great many of the meteors recorded in history have neither day nor month named when they occurred, and even the years named for the occurrence of what is unquestionably the same phenomenon, vary from one to four years. The monks, to whom we are indebted for many of the facts, regarded them as portends, hence, years after, altered the dates so as to coincide with some important, event, disastrous or otherwise, in the history of their country. It is only by the synchronous records of the Arabians or Saracens who then occupied Spain, that the true dates can be ascertained. For this reason it is difficult to verify the theory I propose, as accounting for the phenomena. For the November 13th meteors, when the true dates were ascertained after adding eleven days for difference in style, and allowing for the precession of the equinoxes, to ascertain whether they occurred on November 13th, I found some twelve that verified the theory that they were caused by Mercury. I found that in 1833 Mercury passed the ascending node the last time before the occurrence of the meteors on September 8th. Hence, subtracting any year from 1833, and dividing the difference by .24084225, (which, if I remember correctly, is the length of the Mercurial year), I found that Mercury passed the ascending node in the meteoric year within a few hours—sometimes only minutes—as he did in 1833. As Mercury did so this year, I hence inferred that the meteoric shower would manifest itself on the 13th of November.

I found also a large number of verifications as regards the December meteors, and I found that it requires Venus to pass the ascending node on November 8th. As she did so this year I expect a meteoric display on the night of either December 6th, 7th, or 8th. These meteors, if sporadic, are seen all night.

The velocity of the sun through space is not known. Hence, if the theory should be verified we will know that in sixty-five days he passes over a distance equal to the distance between the orbits of the earth and Mercury; and so likewise in regard to Venus. The importance of this knowledge to astronomy can not be estimated. Yours truly,

JOHN H. TICE.

The comprehensive plan of the geological and economic survey of the Territories, prepared by Director Clarence King, and submitted to the Secretary of the Interior, has received his approval and will be submitted to Congress for the necessary appropriations to carry it out.

ORNITHOLOGY.

THE PECULIARITIES OF MISSOURI ORNITHOLOGY.

NARRATIVE OF AN EXCURSION TO THE GRAND PASS LAKES.

BY ERMINE CASE, JR.

(*Extracts.*)

It was an ideal day of Indian summer, the air thick with sunshine, a golden haze veiling all unsightliness and at the same time blending the brilliant colors dashed profusely over the woods; a thicket of sumac, like a great splash of raspberry juice along the hill-side. Even the turbid Missouri, with its bars, snags and cottonwoods, so aggressively ugly, had taken on the sheen of the glorious October afternoon.

A large skiff was floating down the swift current of that huge ditch, about midway the great state of Missouri. Its crew of three, otherwise drifting idly, were closely scanning the south bank of the stream. The craft was well loaded with boxes, bales, tent, guns, tackle and other paraphernalia of a thoroughly equipped hunting party.

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Meanwhile the wounded duck had raised himself straight up, at least two hundred feet without going forward a yard, and now, with lessening strength, began to sink, and with even motion came fluttering slowly down to the water and sat dazed and dying, only a rod from the boat. I had watched this singular maneuver, with intense interest, and the cool manner too with which my friend awaited the prophesied result. As we approached I could not but observe the extreme brilliance of the plumage of our game, heightened by the declining rays of the afternoon sun. It had every hue; but why mention blue, b'ack, purple, green and white, when all those flat colors were blended, shaded and lit up by the most transcendent iridescence, playing over crest, band, bar and mottle.

"Charlie, what is that wonderful bird?" I asked in a maze of admiration.

"The drake of the wood duck. I believe there is no parallel to its beauty in any bird in any land."

"Why *wood* duck?"

"Well, they live along narrow creeks and wooded sloughs, they are fond of acorns and other mast, wild grapes and berries. I once flushed a dozen of them from under a pigeon oak and killed two a half mile from water. You look skeptical, but it is a fact; and you will be more than satisfied when you come to taste their flavor obtained from these same wild fruits."

"Do you mean to say you think the flavor of game materially affected by their peculiar food?"

"Certainly I do; but especially is it true of ducks. In the south the mallards live in the swamps and eat snails, lizards, frogs and swamp vegetation. They return to us unfit for the table. In the north they feed on grain, wild rice and seeds. Consequently they come down to us in the fall season plump and solid. Your vaunted canvas back is only choice when feeding on wild celery in Delaware Bay or the Chesapeake."

"But to return to the wood duck. I have not told you all his arborescent habits. When in pursuit of hackberries and grapes he often perches in the trees. It not uncommonly builds its nest and raises its young in the tops of old tree stubs, and in the ends of hollow branches. I have not only seen this myself, but it is the common observation on the part of all hunters. The young are kicked out and then partly assisted to the ground on the back of the mother, as is the case with the young of scores of other birds."

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"Besides the capital duck shooting," said Charley, "we are in the best field for ornithological pastime that can be found in America. The lower Missouri valley is neutral ground in more than one respect. Here we have long summers, and hot enough, too; while in the winter season, owing to the open prairie country toward the north and west, we often have days worthy of the North Pole. Then the extremes of moisture and drouth are ours. In the spring months the rains are many and wet, while the rest of the year they come "only by fasting." The mingling of flora is equally peculiar, and if the gods do prosper, we will have such chats about them all as we used to have in the old days when we pored over Audubon and delved in the swamps with Wilson."

Off to the east stretched the two (Grand Pass) lakes, sleeping among their willows, cat-tails and pampas grass. And now, as the sun was setting, long lines of water fowl were seen constantly swinging down and settling among the frosted lily pads. But there was to be no shooting to-night, as Kimbrough had announced that he never began work until the camp was perfect.

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We turned in early on a cozy bed of straw and blankets, Charlie's last remark being, "Ben, we must be off to the lake for the morning flight by four. Have us a cup of strong black tea." I felt the old black man coil himself up at our feet, listened a moment to a far away tattle of gabbling mallards, and then fell into that absolute lapse which always receives the well fed, hard working lover of out door sports.

Bright awake at once is the camping sportsman. No yawning and stretching. A splash of hands and sluicing of face and neck in the cold running stream; then you are hungry. But black tea and crackers must do for this early bite, and we are off through the frosty grass, under the still shining stars, well wrapped in coats and capes, belts full of loaded shells, cold gun barrels tucked under arms, and Splash, the Spanish retriever, at our heels.

Skirting the margin of the lake for half a mile, we passed out on a narrow point which made into the lake, and was covered at its extremity with thick

clumps of wild rose bushes, ensconced ourselves between two of the thickest and awaited the dawn. White in the east, and the stars flickered out; then pink, followed by rose, and meanwhile the lake was becoming voluble. The low gabble of mallards arose from the reeds; a tattle of teal and widgeon among the lily-pads; then far off down the lake we heard the coarse call of the trumpeter swan, like a distant fog bell. Oh! then, such a weird, seraphic band, as a score of those magnificent birds rose, circling upward a thousand feet, where the first rays of the sun caught their angelic pinions, and bathed their pure white plumage in rose. Such another graceful sight I never expect to see. But here I was recalled by the loud "quack, quack," of a flock of mallards crashing up through the reeds with a clamor and splash that made the lake resound.

"Now," said Charley, "be ready; we will have some shooting." But I was too much interested in the awakening of this populous city to care for sport; so peering out through a port-hole in our brambly blind, I saw the welkin take life. A thousand noisy mallards rose with flap and splash and cry, red heads, whistlers, pin tails, widgeon, teal—in droves, flocks, pairs and alone. The valley was filled with their maze of swiftly crossing lines. Back and forth, circling, rising, sinking. "Bang! bang! and again bang! bang! With the thud of falling birds upon the water, the clatter and clamor of those escaping, the splash of the whimpering retriever, and Charley's cheery cry—"Fetch him, good dog! Get him, Splash! Good boy!" from bluff to bluff the echoes resounded. Then as I gazed the arena cleared and quieted. In twenty minutes the lake was as quiet as a park pond; and all the while my gun lay on my arm unloaded.

"Why, you haven't fired a shot, Ned."

"No, but I have seen a new and wondrous sight."

"So you have. I remember well the first time I saw such a rising. But I have become so accustomed to it that I did not think how it would amaze you."

"It has been worth the cost of the whole trip to see it. Such numbers, such variety!"

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As we lay on the sunny side of a knoll after breakfast, taking our smoke, I asked—

"Why Grand Pass Lakes, Charley?"

"Lakes, because they are small bodies of water surrounded by land. *Pass* Lakes, because yonder high bluff constitutes a narrow divide between the south bank of the lake and the north fork of the Lamine river, and along that strait road the Indian tribes used to pass on their annual visit to the post at St. Louis. *Grand* Pass Lakes, because the French are fond of the prefix. Throughout countries where they were the early settlers, you will find grand rivers, grand prairies, and grand hillocks by the score. The lakes are only four or five miles long and without beauty; are devoid of interest save as a famous resort for water-fowl, yet we can get some good bass and croppy if you choose to try the rod."

"Can we? We'll try, some afternoon; but just now I would like to hear

you lecture on some of these duck. What is that little fellow Ben is holding up yonder, with the bright green wing coverts?"

"That is a green winged teal. It does not differ from the blue winged in any important particular. There is a little difference in size, which is in favor of the blue winged. They are named from the blue and green coverts of the wing. The green has a crescent of white just in front of the wing, you see. Now here in this blue one it is absent. They are confined almost exclusively to North America, but range very widely over that. They are known familiarly from Alaska to the West Indies. They nest from the far north to sometimes as far south as this. They go and come with the seasons, a little earlier in autumn and a little later in spring than the mallards and other large ducks. There is no better table bird among the ducks. But perhaps the most noticeable feature of the teal, is its velocity of flight. It is believed by our best observers that in rapidity it exceeds all other birds. Any experienced wing shot will tell you the difference between stopping a teal going down wind on business, and any other known game bird. But I have one well defined instance of measurement. I once shot, here in the Missouri valley, a blue winged teal with wild rice in his crop. As near as I have been able to ascertain, wild rice does not grow nearer us than five hundred miles in a right line. Food does not remain undigested in the crop of a bird more than four hours; therefore, my skeptical friend, that particular teal made that long flight at the rate of one hundred and twenty-five miles an hour."

Here Charlie sprang to his feet, seized his gun, and ran out toward the edge of the timber at a furious pace, at the same time slipping in shells, which he took from his pocket. Stopping behind a large elm at the border of the open, he stood in readiness to shoot. Along the line of timber came sailing, on even wing, a dozen large birds, anon beating their short pinions rapidly and again soaring, after the manner of all grouse. In much less time than I have taken to write it, the flock were abreast the hunter, and at the quick repeated explosion of the double barrel, down plunged two, heavily, into the thick marsh grass.

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"I was not aware grouse were migratory. Surely the authorities do not give prominence to such a habit."

"No. Still it is a fact that throughout the region west of the Mississippi these birds regularly migrate. Ornithological writers give general statements. They cannot enlarge on the effect of varied climates and topography. Now, the grouse of Long Island and Martha's Vineyard have never been migratory. Nor have they on the small sheltered prairies of Indiana and Kentucky. But from Minnesota, Nebraska and Iowa, they are driven by the fierce sweeping winds, and pass on below us in thousands every autumn. They do not usually go below the southern line of Kansas and Missouri, and there they are no longer found in small coveys, but gather in enormous flocks and become a scourge to the cornfields. But, alas for civilization, they are not to be seen now as they were ten years ago. Each year their line of flight is farther west. Many are now found

on the plains themselves, and there they have no cover but the short curling buffalo grass. I have no doubt this very lack of cover on the plains will finally prove their extinction. There are no tall grasses, no bushes and brambles. The eggs and the young are exposed to hawks, eagles, wolves and all the other little and great lovers of chicken.

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When we arose from the table and began our preparations for going to the lake, the great, fleecy flakes were floating softly down. The old flat was a heavy, cumbersome affair, but roomy and staunch. All the way, while Ben was laboriously pushing the slow craft over the rushes, we could see the advance guard of ducks coming down from the north and settling among the reeds. Long lines of geese passed high overhead, giving out their "Ha-unk, ha-unk." And that afternoon we saw a flock of brant—the "laughing goose"—make their strange, tumbling descent from the clouds. When we first heard their cries, they must have been a thousand feet straight up over the lake. They had stopped in their flight and were circling slowly, when the leading gander suddenly fell as though shot, except that he kept himself in hand, as it were. Headlong he plunged a distance of a hundred feet, when, with a swoop of the wings, he arrested his fall for an instant, and then again dropped. The remainder of the flock did the same, all at different times and independently, each one keeping up his loudest cachinating gabble. An odder sight than these great birds, tumbling over and over one another down through the thickly falling snow, could not well be found.

Momentarily the snow was thickening, as were also the ducks. Constant flocks were hurtling over us; hundreds rose from the sedge as we passed.

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"Duck shooting you have had enough of; the fishing is no more; but, as I see you have still some discrimination in the way of birds, I will show you, tomorrow, what a complete aviary this lake, with its surrounding fringe of timber and willowy islands, really is."

"Capital! You could not please me so well in any other way."

"If the day is mild, you will see something quite worth while. I know of no other region where the variety of aquatic and semi-aquatic birds is so great. Here they come from the far north and from the islands of the Gulf; the 'bay birds' of the Atlantic coast with the fowls of the great dry plains. This part of the Missouri valley is the only place I know which is the meeting ground of such widely diverse species."

"You said something about the causes the other day?"

"It is not very difficult to account for it. Here, as I told you, we have a long, hot summer. Here, too, owing to the open nature of the country, the winter storms drive down with bitter fury. For the same reasons, the flora of this valley partakes of two zones."

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I awoke the next morning with the feeling that some pleasant sound had

stolen in at my ears and around my brain. And so it was. Looking out through the open door of the tent, I saw a form of crimson, sparkling about on the branches of a hawthorn, and ever and anon came the clear, ringing, glorious whistle of the red-bird—the cardinal gros-beak. Charley was watching him, too.

"That fellow is not one of my varieties," said he. "You may hear him wake the morning anywhere, from Montana to Florida."

Reaching the water, Charley lugged a long crooked stick of a mast out of a hollow sycamore log, and, stepping it into its place in the old flat, unfurled a big "leg-of-mutton" sail, and, just as the sun capped the distant bluff, we were off on the circumnavigation of the Pass Lakes.

There will be no cumbersome descriptions of scenery wild, graceful and picturesque; for nothing of the kind was seen. But it was a soft, balmy morning, and the light breeze, which gently filled our sail, rolled up long winrows of fog and softly garnered them away into corners among the willows and cottonwoods on the shore. The clumsy bark moved slowly, and, leaving the management to Ben, Charley and I sat forward, on the look-out for the first of the list of birds.

Ah! right there, fifty feet in front of the boat, where nothing had been, where nothing came, sat, cool and calm, appearing as though he hadn't come there and wasn't going away, a large bird, with a javelin beak, a falchion eye, a head and neck of bluish green, throat-marks of clean-cut white, and thence down breast, wing and back mottled with seried lines of white dots upon iridesent black—the great northern diver, a loon. Without visible motive power, he kept before us. There is no bird more conscious of his power. Now take aim. You have the quickest fire-arm known—a central fire, detonating cartridge. The mark is large and close at hand. Ah! the space is vacant, and the conical ball is skipping off yonder over the lake! Up comes the loon, rises on very tip-toe, shakes his short wings, laughs his wild, mocking, discordant laugh, and sits again, calm and defiant.

"What is that lithe, graceful bird in gray, Charley—yonder, skimming over the lilies?"

"Oh, that little party with the forked tail—the one who is only fifteen hundred miles from home? That is an ocean swallow, one of the gull family. I see a half-dozen or so every year winging familiarly about our ponds."

So, sleepily the old scow moved up the narrow alleys between thick flags and reeds.

"Ben, put in at the first dry point you come to, and we will have breakfast. I do not approve of taking too much morning air *solus*."

And here a burst of song filled all the morning. Teetering on the feathery frond of a long reed, sat the songster. Loud and sweet rang his orison, and in it were mingled the peculiar tunes of a dozen birds.

"Yes," answered Charley to my inquiring look; "the southern mocking-bird. I never saw one a foot north of here, not even on the north side of the Missouri river. And do you note the perch he has selected? That pampas grass belongs to southern plains, and does not grow naturally above this latitude."

"And what, pray, is that long brown chap standing on the lily-pad right below him?"

"Quite apropos indeed! and not to be seen here once in a season, either. 'This occasion only,' you know, for your benefit. A Carolina rail, forsooth."

"Yes; I see his long toes, hairy plumage and generous snout. That will do, now; let's go to breakfast."

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The scow moved on up the lake. White-faced gallinules and coots sported everywhere on the water; with all the little ducks, dippers, spoon-bills, teal and butter-ball. These were not rare. They may be seen on retired ponds in all parts of the country in their season. Yet it is pleasant on a sunny morning to sail slowly along the solitary aisles of such a lonely lake and absorb all the sights and sounds of nature. A red-winged starling swings on yonder reed; the bluest possible kingfisher stands immovable, with eye fixed on the water beneath the old jutting snag, his perch. Then across the whole foreground goes a grey projectile, straight, still, and swift as death. It *is* death—to the starling we saw just now. A screech of terror, a thud, and off goes the hawk with his dinner, which he will take forthwith on the summit of the dead plane-tree yonder.

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"Charley, what are those big black birds sitting on that low, sunken log?"

"Why, now you have a *rara avis* in reality. I have every reason to think they are the red-faced cormorant. I admit that only two or three well authenticated specimens are reported from North America; still I am sure these can be nothing else. I have seen them in the valley twice before."

Meanwhile he was maki· g ready his rifle, and, as he closed, took careful aim and fired. The old ark was moving slowly, but enough to divert the ball, and the heavy, sluggish birds took to wing unharmed. They were bluish black in color, with a crimson fez over their faces like the turban of a turkey cock, a slight crest, and plumage richly irridescent. As they flapped off, a great blue heron was aroused from his siesta, and added his lank, awkward flight to the scene.

"Herons, mocking-birds and rail from the far south; swans, cormorants and loons from Alaska, and a gull from mid-ocean. Let's pass on to the next cage," I exclaimed in wonder.

"The bald eagles floating yonder are not rare, but picturesque. However, I have one remaining stranger I wish to introduce."

"Do you mean the tall party yonder in white, peeping over the black flags?"

"Oh, no!" answered Charley. "The white crane is not exactly a stranger, though not numerous. He makes a fine tableau there. Should be sketched in conventional form, with the black flags for contrast, for the frieze of a dining-room."

All this while the scow had been gliding down narrow aisles among the reeds, now rounding a willow island, and anon squeaking over the rushes or grounding on masses of lily-pads and water moss.

The evening before we enjoyed a gust of snow. To-day the air was as balmy and the sun as mellow as ever yellowed the olives of Sorrento. When almost at the foot of the lake, we slid out into open water shallowing out upon low sand-bars.

"Ah!" exclaimed my friend; "there are my final marvels. Here is the last cage in my aviary." And he pointed to some immense white objects, evidently birds, larger than swans; some moving slowly about in the shallows, others basking on the bar.

"Not geese, surely?" I inquired.

"No, nor swan."

"Nor cranes with their heads cut off?"

"Hardly. I guess they will develop heads as we move up."

And they did. One big fellow on the bar stretched forth his head, heavily laden with mandibles fifteen inches in length. Then he spread forth his broad pinions and rose slowly. He was now neither headless nor all white, for the extremities of the wings were jet black. An immense membranous sac at the throat settled the question.

"Pelicans!" I exclaimed. "Are we on the Congo, or among the South Sea Islands, Charley?"

"Only in Missouri—a missionary field, nevertheless."

The whole flock of some twenty had flown also; and Charley ordered the ark turned about, and the return trip began.

"Are those birds common about here?" I asked.

"By no means; though any one who goes poking his nose into solitary corners as often as I do, will see them frequently. While duck hunting up the river here once, some years ago, I saw twenty thousand of them fishing together in one pond."

"Twenty thousand pelicans? You must think I'm a—"

"Keep cool, my boy; I'm not going to tell you the story. I tried that once, and no one believed it."

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There was a low piece of spouty ground lying between the bluff and the lakes and while taking breakfast next morning in the door of the tent, I saw a large flock of small birds whirl round and drop into it.

"Jack snipe," said Charley. "They come south in the autumn in large flocks. That marsh will be full of them for a few hours, and then all will resume their migration together."

"Is it not very late in the season for snipe?"

"Not in this climate. I have seen them, and woodcock, too, as late as Thanksgiving day.

"We need a few of them, don't we, Ben?"

"Fine brile, sah."

And off we started. The soft tussocks were full of them, and the spaniel had barely passed the first line of bog when—"Skaip, skaip, skaip!"—up sprang a half dozen together and went twisting spirally off. Well, this was easier work, and I

forgot all about the teal in the pretty, open shooting at the long-bills. For forty minutes we hammered away with both guns, when the birds got sick of it and all whirled off together over the bluff to the southward. We delighted the old darkey's heart when we laid down thirty-one of the fat speckled beauties for his larder.

We had spread ourselves out upon the grass and again I was pumping Charley on our favorite topic—birds.

"Paradise of game birds, you say? Yes; but the roll is not called yet. I will agree to bag, before noon to-day, quail, curlew, plover and woodcock, with just a mite of a chance for a wild turkey and a ruffed grouse; but I am reserving them for another trip."

Just here we heard the distant whistle of a steamboat.

"There she blows!" shouted my friend, springing to his feet. "That is the Joe Kinney blowing for Malta Bend. We will just be able to unlimber here and get all our traps aboard when she comes up to the mouth of the creek."

At it we went, and a half hour later our little barge dropped away from the cozy camping ground, with everything snugly housed in their several cases.

The savage (perhaps it is the reverse of savage) is strong in some of us. The overhanging elm had become familiar, the glade and brook grown to be household spirits, and I left that camp of five days with sincere regret, thinking that possibly the accessories of comfort, style, fame and bread we struggle for so wearily in cities are, after all, only dungeons ingeniously fitted up by ourselves with high, thick walls and grated windows.

CHEMISTRY.

PURITY OF CITY WATERS.

FROM DATA FURNISHED BY WM. PAUL GERHARD, C. E., ST. LOUIS, MO.

EXAMINATION OF MISSISSIPPI RIVER WATER. BY WM. PAUL GERHARD, C. E., ST. LOUIS, MO.

Date.	Locality.	Chlorine.	HARDNESS OF WATER IN DEGREES. CLARK'S SCALE.			Total Solids.
			Permanent.	Removable	Total.	
	Water taken from water pipe at					
Oct. 7, 1878	City Hall	——	——	——	13	——
Oct. 17, 1878	do	——	——	——	12¾	——
Nov. 17, 1878	do	1.4	——	——	12¼	——
Nov. 23, 1878	do	1.3	——	——	12.1	25 grs
Nov. 30, 1878	do	1.3	3.75	——	——	
Dec. 18, 1878	do	1.3	3.50	10.00	13.50	
Apr. 26, 1879	do	0.8	——	——	——	
July 15, 1879	do	0.7	——	——	6.9	
July 29, 1879	do	——	——	——	6.9	
Aug. 16, 1879	do	0.55	——	——	——	

SANITARY EXAMINATION OF 12 WELLS.

SITUATED ON EAST AND WEST SIDE OF JACKSON ST., BETWEEN RUTGER AND SOULARD STS., ST. LOUIS, MO. BY WM. PAUL GERHARD, C. E.

No of S'mple	Location of Well.	Depth of Well. Feet.	Pump or draw well	Grs. Imp. Gal. Chlorine.	Hardness.	Organic Matter.
1	1436 Jackson St., in yard . .	about 30	Draw well	9.7	40	. . . . .
2	1628 Jackson St., in yard . .	——	Pump	14.8	37.5	. . . . .
3	1446 Jackson St., in yard . .	40–50	Draw well	13.0	42.5	. . . Present
4	1555 Jackson St., in yard . .	——	Pump	24.0	45.0	. . . Marked
5	1418 Jackson St., in yard . .	35–40	Draw well	13.8	42.5	. . . . .
6	1609 Jackson St., in yard . .	30	Draw well	2.3	27.5	. . . . .
7	1508 Jackson St., in yard . .	25–30	Draw well	9.0	34 5	. . . Present
8	1316 Jackson St., on sidewalk	——	Pump	14.0	40.0	Large amount
9	1445 Jackson St., in yard . .	——	Pump	13.2	47.5	. . . . .
10	1549 Jackson St., in yard . .	30	Draw	17.0	47.5	. . . Present
11	1424 Jackson St., on sidewalk	——	Pump	7.0	30.0	. . . . .
12	1621 Jackson St., in yard . .	20	Draw	37.0	60.0	Very large amt

RELATIVE PURITY OF CITY WATERS.

City.	Source of Supply and Name of Chemist.	Inorganic Matter.	Organic and Volatile Mat	Total Solids.
New York . .	Croton, (average, 13 weeks, 1867) C. F. Chandler	3.90	0 66	4.56
New York . .	Croton, (average, 3 months, 1868) do	3.31	1.14	4.45
New York . .	Croton, (average, 6 months, 1869) do	4.11	0.67	4.78
New York . .	Croton, (May 11, 1871) . . . . do	2.799	0.875	3.674
New York . .	Croton, av'ge, 5 mos. winter '71–'72 (E. Waller)	3.934	0.508	4.442
New York . .	Well, west of Central Park, (C. F. Chandler, . .	38.95	4.55	43.50
Brooklyn . .	Ridgewood, av'ge 3 mos. 1869 (C. F. Chandler)	3.37	0.59	3.92
Boston . . .	Cochituate, (E. N. Horsford)	2.40	0.71	3.11
Philadelphia.	Fairmount, Schuylkill, (E. N. Horsford) . . .	2.30	1.20	3.50
Philadelphia.	Delaware (H. Wurtz)	2.93	0.55	3.48
Albany . . .	Hydrant, (E. N. Horsford)	8.47	2.31	10.78
Utica	Hydrant, (C. F. Chandler), ...	5.50	0.96	6.46
Troy	Hydrant, (W. Elderhorst)	6.09	1.34	7.43
Syracuse . .	New Reservoir, (C. F. Chandler	12.13	1.80	13.93
Cleveland . .	Lake Erie, (J. L. Cassels)	4.74	1.53	6.27
Chicago . . .	Lake Michigan, (J. V. Q. Blancq)	5.62	1.06	6.68
Rochester . .	Genesee River, (C. F. Chandler)	12.02	1.23	13.25
Schenectady	State Street Well, (C. F. Chandler)	46.88	2.33	49.21
Newark . . Jersey City Hoboken Huds'n City	Passaic River, (E. N. Horsford)	4.58	2.86	7.44
Trenton . .	Delaware River, (H. Wurtz)	2.93	0.55	3.48
London, Eng.	Thames, (Dr. Letheby)	15.55	0.83	16.38
Paris, France,	Seine, above the city, (Bussey, Wurtz and Ville)	7.83	1.00	8.83
Amsterdam .	River Vecht	14.45	2.13	16.58

(Taken from C. F. Chandler's Report upon the Sanitary Chemistry of Waters, 1875.)

ANALYSES OF HUDSON AND CROTON RIVERS.

BY PROF. C. F. CHANDLER, PRESIDENT NEW YORK BOARD OF HEALTH.

	Grains per U. S. Gallon.	
	Hudson River.	Croton River.
Chloride of Sodium	0.361 grains	0.402 grains
Chloride of Magnesium	0.157 "	——
Sulphate of Potassa	0.076 "	0.179 "
Sulphate of Soda	——	0.260 "
Sulphate of Lime	0.980 "	0.158 "
Bicarbonate of Lime	4.165 "	2 670 "
Bicarbonate of Magnesia	1.397 "	1.913 "
Silica	0.408 "	0.621 "
Alumina and Oxide of Iron	0.070 "	a trace
Organic and volatile Matter	0.699 "	0.670 "
Total,	8,313 grains	6,873 grains
Hardness,	3°.35	2°.51

Taken from C. F. Chandler's Report on the Waters of the Hudson River, made to the Water Commissioners of the City of Albany, 1872.

MILWAUKEE WATER WORKS.

WATER FROM LAKE MICHIGAN CONTAINS IN 100,000 PARTS,

Constituents,	Lime	4.8 parts
	Magnesia	1.6 "
	Soda	0.2 "
	Silica	1.6 "
	Sulphuric Acid	0.5 "
	Chlorine	0.3 "
	Carbonic Acid	5.3 "
	Chloride of Sodium	0.6 "
	Sulphate of Lime	0.9 "
	Bicarbonate of Lime	7.9 "
	Bicarbonate of Magnesia	3.5 "

Taken from the First Annual Report of the Commission of Health of Milwaukee, 1879.

CHICAGO WATER SUPPLY.

Water from Lake Michigan, analyzed by Drs. Blaney and Mariner, holds in one U. S. Gallon, 58,318⅔ grains; Organic Matter, 1.2727; Mineral Water, 5.9593, based on the following constituents:

Sulphuric Acid	.3024
Sodium and Potassium	.1389
Chlorine	.2083
Silica	.3512
Lime	2.4796
Magnesia	.6789
Peroxide of Iron and Alumina and Phosphate	.0756
Carbonic Acid	2.5043

BOSTON WATER SUPPLY.

WATER FROM COCHITUATE LAKE.

Date.	Observer.	Parts pr 100,00			Grns. pr U.S.Gal		
		Inorganic.	Organic & Volatile.	Total.	Inorganic.	Organic & Volatile.	Total.
July 1. 1834	C. T. Jackson	——	——	6.00	——	——	3.50
May, 1837	A. A. Hayes	2 11	0.93	3.03	1.23	0.54	1.77
July, 15, 1845	B. Silliman, Jr.,	2.09	1.08	3.17	1.22	0.63	1.85
September 8, 1845	do	3.78	1.99	5.77	2.21	1.16	3.37
September 8, 1845	do	4.54	2.38	6.92	2.65	1.39	4.04
September, 1848	E. N. Horsford	2.90	2.45	5.35	1.69	1.43	3.12
December, 1854	C. T. Jackson	2.59	1.84	4.43	1.52	1.07	2.59
——	do	5.14	3.43	8.57	3.00	2.00	5.00
February, 1855	do	5.54	2.34	7.88	3.23	1.37	4.60
——	do	4.14	2.03	6.17	2.42	1.18	3.60
December, 1870	W. R. Nichols	3.08	1.12	4.20	1.80	0.65	2.45
——	J. Dana Hayes	4.06	1.42	5.48	2.37	0.83	3.20
October 1, 1872	S. P. Sharples	2.01	2.78	4.79	1.17	1.62	2.79
December, 1872	W. R. Nichols	3.00	2.30	5.30	1.75	1.34	3.09

Taken from Prof. Wm. Ripley Nichol's Report on Present condition of certain rivers in Massachusetts, together with considerations touching the water supply of towns.

BOSTON WATER SUPPLY.

COMPLETE ANALYSIS OF COCHITUATE WATER, BY PROF. WM. RIPLEY NICHOLS, JULY 4, 1873.

	Parts per 100,000.	Grains per U. S. Gallon.
Ammonia, free	0.0033	0.0019
Ammonia, albuminoid	0.0120	0.0070
Inorganic	2.84	1.66
Organic and volatile	2.80	1.63
Total dissolved matters	5.64	3.29
Chlorine	0.34	0.20
Sulphuric Acid	0.91	0 53
Silica	0.28	0.16
Alumina, Oxide of Iron (and trace of phosphoric acid,	0.85	0.50
Lime	0 42	0.25
Magnesia	0.06	0.03
Soda	0.17	0.10
Potash	0.25	0.15
Carbonic Acid	undeterm'd	——

Taken from Wm. Ripley Nichols' Report on Present Condition of Certain Rivers in Massachusetts.

EXAMINATION OF WELL AND CISTERN WATERS

AT COLUMBIA, MO., BY PROF. PAUL SCHWEITZER, UNIVERSITY OF MISSOURI.

WATER.	Grains per gallon of inorganic matter.	Grains per gallon organic matter.	100 c. c. water require c. c. permanganate.	Remarks.
Distilled water	. . . .	Trace	1.5	
Rain water	. . . .	Trace	2.8	
JUNE, 1879.				
Cistern near English building	2.5651	3.2710	9.0	
JULY, 1879.				
V. Barth, cistern, new,	14.4532	8.5374	12.0	
Mr. Loeb, cistern, new,			9.5	
Dr. Duncan, cistern, 1	4.2880	2.7654	3.0	
Dr. Duncan, cistern, 2	7.4367	3.1042	7.5	
Irvin Switzler, cistern	4.5162	3 9201	2.5	
G. M. McConaughey, cistern	7.0213	2.4312	6.0	
Mr. Loeb, well	27.9752	Trace	3.0	
Mr. Batterton, well	66.1723	Trace	2.5	(*)
Mr. McConaughey, well	46.5932	9.9685	8.6	
AUGUST, 1879.				
Mrs. Flood, cistern	4.8245	2.1037	2.5	
Mission School, cistern	3.6255	4.1142	2.5	
Ed. Stephens, addition, cistern	6.3187	1.4211	3.5	
Pres. Rogers, cistern	2.0214	4.6721	6.5	(†)
Dr. Garnett, cistern	2.3202	4.4313	5.5	
P. Schweitzer, cistern	2.4213	4.2132	3.5	
Mr. Allgaier cistern	3.7148	4.9782	4.0	
Prof. Ficklin, well	38.3573	Trace	2.5	
Mr. Scruggs, well	36.2542	Trace	1.5	
Pond, Anderson, H. & Co., mill	7.2139	4.6721	3.0	
Pond, University campus	11.3102	3.3201	3.0	
Pool, Dr. Duncan, cow lot	29.0135	12.4213	10.0	(†)
Pool, Broughton & Adams	31.8932	10.7532	10.0	
1875, Missouri River, Jefferson City	19.2900	1.6296		
1856, Missouri River, Carrollton	15.4870	0.8180		

(*) Contains Nitre. (†) Contains much Ammonia.

EXAMINATION OF RIVER, WELL AND CISTERN WATER OF KANSAS CITY, MISSOURI.

BY PROF. G. E. PATRICK, UNIVERSITY OF KANSAS.

LAWRENCE, KANSAS, October 25, 1879.

MR. THEO. CASE; *Dear Sir:*—The amount of water in your samples was not sufficient for analysis by the most approved and accurate method, (Wanklyn's) but sufficient to determine whether *good* or *bad*, and also to ascertain the relative

qualities. As to *Chlorides*—not in themselves injurious of course—but a sign of sewage contamination in cities where the drainage water of the soil does *not* contain them, your samples gave: No. 1, Kaw, considerable; No. 2, cistern, none; No. 3, well, considerable. Nos. 1 and 3 about the same amount. As there is so much salt in our waters I did not take these results as indicative of sewage impurity; still, to make the matter certain, I compared water taken from the river *above* Lawrence, with your sample, and found the same amount of chlorides.

As to Ammonia, itself not injurious, but indicative of decomposing animal or vegetable matter, but a trace was found in all three samples, more in one and three than in two, still not enough in any of them to condemn or even to render them suspicious.

As to Organic Matter, as indicated by the "permanganate method," the amount in all was small compared with that in many waters considered wholesome. The relative amounts were about as follows: No. 1. 3; No. 2, 1; No. 3, 1.5. The river water was much worse than the others, but by comparison with distilled water, I found it was not bad at all. As explained above I could not with the amount of water at hand, get at the absolute amount of organic matter. From this examination it seems that your water supply in Kansas City, except where contaminated by local impurities, is excellent. Respectfully,

G. E. PATRICK.

BOOK NOTICES.

CHALLEN'S ALPHABETICAL RECORD OF NEW BOOKS. Philadelphia, June to October, 1879. Howard Challen. $1.00.

To book buyers, editors and others interested in current literature, Challen's Record will be found of decided value. It is published quarterly and embraces complete lists of all new books, with names of authors and publishers. It is also supplied with blank leaves for receiving titles of books published between its issues, and other memoranda.

THE THROAT AND THE VOICE. By J. Solis Cohen, M. D. Philadelphia, Lindsay & Blakiston; pp, 159, 12 mo. 50c.

This is Number V of the American Health Primers, edited by Prof. W. W. Keen, M. D., that are having such a run as popular and trusted hygienic guides. Prof. Cohen, from his position as lecturer upon the Diseases of the Throat and Chest, in Jefferson Medical College and upon Physiology and Hygiene of Voice in the National School of Elocution and Oratory, has a wider range of personal experience on the subject than most physicians, to which he is fortunately able to add what is equally essential in this instance, a facile pen. The topics treated,

among which are the general construction of the throat, care of the throat, diphtheria, croup, enlarged tonsils, foreign bodies in the throat and windpipe, catarrh, cultivation of the voice, acoustics of voice, defects of voice, &c., are handled skillfully, and the directions given are eminently practical and proper, though without entering upon the domain of the physician.

WINTER AND ITS DANGERS. By Hamilton Osgood, M. D. Philadelphia, Lindsay & Blakiston. pp. 160; 12 mo. 50c.

Equally appropriate with the above, is this little monogram by Dr. Osgood, one of the editors of that staunch old periodical, the *Boston Medical and Surgical Journal*. It makes its appearance just at the proper time to give its readers those warnings and instructions which are so important, no matter how frequently repeated, and which, if duly observed, will ward off so many of the ailments of winter. The titles of a few of the chapters will indicate the scope of the work: Dangers arising from errors of dress; inattention to pulmonary food; sedentary life and neglect of exercise; dangers of school life in winter; winter amusements, &c. Dr. Osgood writes plainly, insisting with Spencer, that "all breaches of the laws of health are physical sins," and deeming it his conscientious duty to "spare neither age nor sex" in discussing such sins.

THE WORKSHOP COMPANION. Industrial Publication Company, New York; pp. 164, 12 mo. Paper, 35c.

This is one of those *multum in parvo* books, in the collating and arrangement of which Prof. John Phin, C. E., so excels. There is probably not a single reader of this notice, that has not at some time or other felt the want of some item of information contained in it, and would gladly have given the price of the volume for one of the recipes. The book covers a very wide range of subjects, there being no less than ninety leading articles, some of which contain as many as sixty sub-headings. The pages are of good size and closely printed in very clear type, so that 164 of them contain an unusual amount of matter. The subjects are arranged alphabetically, the work thus forming an almost complete encyclopedia of practical every day information. Although entitled "The Workshop Companion," a brief examination will show any reader that he needs it, whether mechanic, professional man or housekeeper.

THE COSMOGONY OF LA PLACE. By Daniel Kirkwood, LL. D.

We have received from the distinguished author a copy, reprinted from the Translations of the American Philosophical Society, of his article entitled as above, the conclusions of which may be stated as follows: "1st. The hypothesis of La Place gives no explanation of the immense intervals between the planetary orbits. 2d. That apart from this objection, the periods required for the formation of planets from nebulous rings are greater than the probable age of the solar sys-

tem. 3d. That it fails to account for the origin of satellites. And 4th. That it is apparently incompatible with a known physical law. The conclusion seems inevitable that this celebrated hypothesis must be abandoned, or that its principal features must be essentially modified."

OTHER PUBLICATIONS RECEIVED.

PROCEEDINGS OF THE PHILADELPHIA ACADEMY OF NATURAL SCIENCES. Part II.

On the Fertilization of Yucca, by Prof. Thos. Meehan. On Sex in Castanea Americana, by same author. On the Law governing Sex in Plants, by the same author. How to study Phrenology, by H. S. Drayton, editor *Phrenological Journal*, (illustrated) S. R. Wells & Co., Publishers. The Quarterly Elocutionist, October, 1870, Mrs. Anna Randall Deihl, $1 00 per annum, Prospectus of the Manual Training School of Washington University, St. Louis, Mo. The Medical News and Abstract, January, 1880, edited by I. Minis Hayes, A. M., M. D., Henry C. Lea, Publisher, Monthly, $2 50 per annum. Report of Commissioner of Agriculture, 1878. American Bookseller Annual Illustrated Catalogue. The Blacksmith & Wheelright, N. Y. Monthly; $1.50.

NECROLOGY.

OBITUARY NOTICE OF THE LATE PROF. BENJAMIN F. MUDGE.

BY PROF. JOHN D. PARKER, KANSAS CITY, MISSOURI.

Prof. B. F. Mudge was born at Orrington, Maine, August 11, 1817. When two years old he removed with his father's family to Lynn, Massachusetts, which place numbered his ancestors among its first white settlers. His parents were eminent for their piety, charity and hospitality. They encouraged studious habits among their children, providing them with good reading and stimulating them to literary attainments and knowledge.

Three of Prof. Mudge's older brothers entered the Methodist Episcopal Conference, the oldest of whom died early in his ministry. The second was distinguished as a linguist, particularly in the Greek and Hebrew languages; the youngest, and only one now living, having won an enviable reputation as an author of historical Sunday-school books.

Prof. Mudge graduated at Wesleyan University at Middletown, Connecticut, in 1840, from which institution he received his degree of A.M. several years later. During his vacations and at odd moments, he diligently pursued his studies in

natural history, and, although two years after he graduated he entered the bar, yet he never relaxed his interest in them, and for many years the Lynn Natural History rooms contained a large cabinet of his collecting, which was afterward removed to Kansas.

After sixteen years practice of law, during which he attained a wide reputation for uprightness and fair dealing seldom deservedly received by lawyers, he removed to Cloverport, Kentucky, where he was connected with the Breckenridge Coal and Oil Company.

On the breaking out of the Rebellion he located in Kansas, a state he had been strongly interested in from its first beginnings. He located in Wyandotte county, and his natural love for geology soon becoming known, he frequently delivered lectures on his favorite study through the country. In 1864, although a comparative stranger in the state, he was requested to deliver a course of lectures before the Legislature, whereupon that body conferred upon him the office of State Geologist, an honor entirely unsought for, yet thoroughly enjoyed. While the state appropriation provided for this office but a short time, in reality he filled the office for life, for until the day of his death he constantly received specimens for examination directed simply to "Kansas State Geologist." No matter to what city they were directed, they seemed by common consent to be forwarded to Prof. Mudge; and many a little fortune has been saved to its owner from hazardous ventures for coal, lead or precious metals, by the truthful and always kindly advice from one who knew well how to read "sermons in stones."

In 1865 he was elected to fill the chair of Natural Sciences in the Kansas State Agricultural College, to which institution he donated his valuable collection of geological specimens, which, during eight years connection with the college, he very largely increased in numbers and value. It was during one of his summer vacations that he discovered *Icthyornis dispar*, a bird with bi-concave vertebræ and teeth—an anomaly to science. In severing his connection with the college, the students, deeply grieved at his departure, presented him with a valuable watch, which he always carried—an ever-loving reminder of the mutual affection between students and professor.

The last years of his life he spent chiefly in making collections for Prof. Marsh, of Yale College, and thus brought before the scientific world many new and rare discoveries in palæontology. In 1878 he was made a Fellow of the American Association for the Advancement of Science, a degree he highly valued.

On Friday evening, November 21, 1879, Prof. Mudge sat at home with his wife, reading the fifth act of Shakespeare's King Lear—the wail over the dead Cordelia—when, feeling a pressure in his head, he stepped out of the door to walk in the cool air. A few moments afterward his companion heard a groan, and hastened to his side, but found him unconscious from a stroke of apoplexy. A physician was hastily summoned, but, by a painless transit, the Professor almost immediately passed to his reward.

On Sunday, November 23, all Manhattan came to look upon his loved form. Scientific friends from various portions of the state and Missouri came to pay warm tributes of praise to the deceased scientist. To the bearers were added four of his scientific friends, Profs. Snow, Popenoe and Parker and Mr. Joseph Savage, all of whom have been intimately associated with Prof. Mudge in his scientific pursuits. The day was beautiful, and the scene, as the immense procession wound its slow and sad way up Cemetery Hill, will not soon be forgotten. And, as the sprigs of evergreen were thrown lovingly into his open grave, we looked forward to the time when he will possess that blessed immortality of which this is a beautiful emblem.

In the summer vacation of 1867, the writer first became personally acquainted with Prof. Mudge, when, by a special invitation, he spent three royal weeks at his home in Manhattan, the days being occupied with making collections in the vicinity of that place, and the nights, until a late hour, in discussing scientific subjects. During this visit was matured the plan for organizing the Kansas Natural History Society, which afterward grew into the Kansas Academy of Science. Of this organization Prof. Mudge was elected the first president, and was again president at the time of his death. During these twelve years he was unwearied in his labors, always cherishing plans for the development and growth of the Academy, whose success formed one of the most joyous experiences of his life. His papers are the results of his own observations and experiments, and are real and substantial contributions to knowledge. While professor at the Kansas Agricultural College, he spent his summer vacations in making collections on the plains to enlarge his cabinet, the richest and best in the West, and he would often enrich the private collections of his scientific friends with boxes of valuable specimens. While at Topeka at one time, his attention was elicited by seeing impressions on the flagging stones of the side-walks, and this led to the valuable discovery in science of the so-called bird-tracks of the Osage valley. He did much original work in science, and several species which he discovered bear his name.

Prof. Mudge was the prince of collectors in the West, and possessed all those qualities of body and mind which made him truly successful. As a platform lecturer on scientific subjects, he was a general favorite with all classes. In a graceful and easy manner his rich stores of scientific knowledge would flow forth in rich, spontaneous utterances, and he was able to throw a peculiar charm around the facts of science. The Kansas University has recently honored itself by placing him upon its corps of special lecturers. As a teacher he was revered and loved by his pupils. He was wholly absorbed in his college duties, and was the student's best friend. He opened doors in the temple of science, and inspired his pupils to enter in and explore for themselves. As a friend and companion he was always true and genial. His friendships were remarkably warm and lasting. He was greatly beloved by all his neighbors, and this is a very sure test of a good man. He possessed a native purity and refinement of soul, more akin to the re-

fined nature of woman, which never forsook him in his most social hours. He seemed to be born without fear, and his scientific friends relate instances in their western explorations, when he would lie down without the least fear and sleep until the morning, surrounded by hostile Indians. He possessed great simplicity of life, and always felt as if he was a young man. The benevolence of his nature was wonderful, and he was always giving public lectures without compensation and studying methods of conferring favors upon his friends. He feared God and loved righteousness, and those who knew him best believe that he possessed a deep religious nature.

As long as science has a name and place in the great central plains of the North American continent, Prof Mudge will not be forgotten as a scientific explorer and discoverer.

IN MEMORIAM.—PROF. B. F. MUDGE.

BY MRS. KATE R. HILL, MANHATTAN, KANSAS.

Ah! who thought of death that glorious night—
With its wondrous pictures of shadow and light—
When the eyes of the sentinel-stars looked down
With their smiles of peace o'er the happy town?
Or heard, o'er the murmurings the night breeze brings
From afar, the rustle of "the angel's" wings?
Or o'er the low sweet song that Nature hummeth,
Heard the cry of "Behold, the Bridegroom cometh?"
One last, faint sigh—poor humanity's moan—
And his soul passed out to the "Great Unknown."
Oh, the painless journey, with the goal safe gained!
Oh, the sudden glory, and the heav'n attained!
Yea, our souls stand still 'neath the heavy cross,
For the crown gleams athwart the measureless loss.

As "over the lines," on the swift wings of flame,
Sweeps this wave of grief—surging over his name—
Proud science shall bow in the dust her head
O'er her brave fallen son, aye, her mighty dead,
For her widening paths he reverently trod,
And the God of *Nature* was *Science's* God.

Patient, unselfish, yea, undefiled—
With the trusting heart of a little child—
His lore was the key that he gratefully took
To open the mysteries of "Nature's sealed book."

Oh, grand, rare soul! like entrance was given
The Kingdom of Nature and Kingdom of Heav'n.
Who knows—in those far-away "isles of the blest"—
But his soul marcheth on, in its tireless quest,
Through that mystic land ne'er by mortal explored;
Through the "many mansions" of Him he adored,
'Mid days filled with rapture and glad'ning surprise,
Is learning the wonderful lore of the skies?

Honor, hand in hand with her twin sister, Fame,
Wreathes all over with glory his pure, true name,
But Faith, Hope, and Love—while their quenchless tears fall—
Have written him "Brightest and dearest of all."

EDITORIAL NOTES.

THE November meeting of the Kansas City Academy of Science was very well attended, and the exercises were of an unusually interesting character, consisting of a paper upon "Personal Hygiene," by Prof. George Halley, M.D., which, being oral, cannot be published, as we would like, and another by Judge E. P. West, upon "A Buried Race in Kansas," which will be found in this number of the REVIEW.

A resolution of respect for the late Prof. Mudge was passed, and eulogistic remarks made by several members.

The December meeting, falling in the holidays, was omitted, and the next regular meeting will be held on the last Tuesday in January, 1880, at which time papers will be read by Messrs. Coddington and Gilham.

THE second lecture of the extra course before the Kansas City Academy of Science was delivered on Tuesday evening, December 16, by Prof. Geo. C. Swallow, of the Missouri University. It was a complete and forcible statement of the views of one of the most experienced geologists of the country upon the question of "Evolution and Creation," in which he asserted the truth of the Mosaic account and pointed out the weak points in the evolution theory.

The lecture was well received, and was regarded by the friends of the creation theory as perfectly convincing and satisfactory.

The next lecture of the course will be delivered by Prof. J. T. Lovewell, of Washburn College, Topeka, Kansas, in January, 1880.

WE are indebted to L. Traber, Esq., for photographs of numerous archæological specimens of rare interest, belonging to his brother in Cincinnati; also, to John P. Jones, Esq., of Keytesville, Missouri, and to Ivon D. Heath, of Wyandotte, Kansas, for lists of valuable and interesting archæological curiosities, collected by them respectively.

MR. J. W. NIER, United States engineer in charge of the government work on the Missouri River just above this city, reports that the work is standing well the test of endurance. The high water of last summer did not injure the mattress. Floating masses of ice have not done any harm to the work thus far. The cutting along the Clay county shore has been stopped, and the strong current of the river

is diverted from where it originally ran. The work done so far has been a complete success, but, unless additional appropriations are speedily made, spring freshets are liable to undo it all.

PROF. BELL announces that before many weeks a person in this country can converse with a person in England by telephone.

THE steamer City of Berlin, which recently arrived from Liverpool, was lighted successfully during her voyage, by electricity. Four lights were placed in the saloon and two in the steerage, each having a light power of 400 standard candles, the apparatus being driven by a small four-horse power engine.

THE severest storm ever known in the history of Colorado set in on the Western Range at noon, December 14, and raged until the morning of the of the 15th without cessation. All stages and teams from and to Leadville were snow-bound, and the loss of property and life is thought to be severe, owing to the intense cold, the thermometer indicating 40° below zero.

There has been a severe storm in the Red River of the North country, the thermometer falling very low. Reports at different points indicate 25° to 40° below zero. At this city the mercury has not been below —9°.

THE experiment of employing cats as substitutes for carrier pigeons has been tried in Belgium with very satisfactory results, and it is proposed to establish a regular cat line between Liege and the neighboring villages.

A COUNCIL BLUFFS dispatch says six cars of silk worm eggs, en route to France, were brought to that city on the regular Union Pacific passenger train on December 16, and sent east on a special train. The lot is valued at $6,000,000.

AN alchemist has actually waked up and stepped forth from the sixteenth century, and advertises in the New York *Herald* for a partner with capital to enable him to manufacture gold!

ST. ELMO'S FIRE.—During a thunder storm in August, a pine forest in the Jura was illuminated with a light resembling the phosphorescence of tropical seas.

IF Edison has, as now appears to be probable, finally succeeded in obtaining an effective, practicable and cheap electric light, he has accomplished one of the greatest scientific triumphs of this century, and one which will almost canonize his name forever. Prof. Sawyer, however, doubts his success.

WE have received from a reliable citizen of Seneca, Kansas, in reply to a letter of inquiry as to the facts of the reported tragical death of a resident of that county by being struck by a falling meteor, "No truth in that meteor story *as to this section*. It occurred in the east, and the article was reprinted in a local paper here without credit, which made it appear to have happened here."

PERIODICALS.

THREE good stories will be given in the next number of *Good Company*, as follows: A Basement Story, by Edward Eggleston; A Hard Bargain, by Horace E. Scudder; and The Mystery of Gilliflower Inn, by Lizzie W. Champney. A charming pastoral paper, *Acer Saccharinum*, in which the maple sugar season is invitingly anticipated, will appear. Another of Mr. Towle's enjoyable sketches will have a place, this one being about Bismarck; also, more Roman Mosaics. Sidney Lanier and Rose Terry Cooke will have contributions, and many other contributions will be given. The first four numbers of the present volume given, without extra charge, to new yearly subscribers who send before January 1.

THE *Atlantic Monthly* is to contain more good things than ever, and in more inviting form. Beginning with the January number, it is to be printed from larger type on a page considerably larger than the former, and will be increased to 144 pages.

A new serial story, by Mr. Howells, begins

in the January number, and will run through six months or more. This is probaby the most gratifying announcement that could be made to American magazine readers.

The fine life-size portrait of Dr. Holmes, which Messrs. Houghton, Osgood & Co. offer for a dollar to the subscribers for the *Atlantic*, can hardly fail to have a very large circulation; certainly not, if the American people remember how much the wise and witty "Autocrat of the Breakfast Table" has contributed to the brightest and best, and the most entertaining portion of American literature.

THE *American Naturalist*, edited by Profs. Packard and Cope, presents in its December issue the following contributed articles: Archæology of the Champlain Valley, by Geo. H. Perkins; The Origin of the Domestic Animals, by G. De Mortillet; Historical Sketch of the Science of Botany in North America from 1635 to 1840, by Frederick Brendel; On the Extinct American Rhinoceroses and their Allies, by E. D. Cope; a full digest of Recent Literature; also, general notes, carefully made up by the editors and their associates, on Botany, Zoölogy, Anthropology, Geology and Palæontology, Geography and Travels, and Microscopy.

THE *Engineering and Mining Journal* continues to be the best authority in the country upon mines and mining, besides furnishing spirited editorials on industrial and kindred topics, a valuable summary of current science, market reports on minerals, mining stocks, etc. etc.

THE *North American Review* grows in cosmopolitan interest and importance. In the January number M. Ferdinand de Lesseps examines the different schemes that have been proposed for the construction of a Ship Canal across the Isthmus of Darien, connecting the Atlantic and Pacific oceans. The second article is by Francis Parkman, who reviews the arguments adduced in favor of Woman Suffrage by five advocates of that measure in the November number of the *Review*. Mr. Froude, in the latter half of his article, Romanism and the Irish Race in the United States, recounts the history of English rule in Ireland. That history is, according to him, a succession of blunders on the part of the successive English governments. Henry James, Jr., contributes an article on the life and letters of the eminent French critic, Sainte-Beuve, one of the most interesting figures in the annals of literature. An article by Prof. Alexander Winchell, on The Metaphysics of Science, goes to demonstrate the existence of a realm of thought deeper than the data of physical science, and on which the principles of science are dependent for all their validity. Mr. Cuthbert Mills, in his closing paper on The Permanence of Political Forces, considers the question of the currency. The literary notices are by Richard Henry Stoddard, who reviews three volumes, viz: Arnold's Light of Asia, Dr. Joyce's Blanid, and Bayard Taylor's Poetical Works.

THE *Popular Science Monthly*, conducted by E. L. and W. J. Youmans, and published by D. Appleton & Co., 549 and 551 Broadway, New York, presents the following table of contents for January: The International Weather Service (illustrated), by Professor Thompson B. Maury; John Stuart Mill, V, by Alexander Bain, LL.D.; A Roguish Household Pet (illustrated), by Frank Buckland; On the Migrations of Races, by Friedrich Müller; Vaccination in New York, by R. Osgood Mason, M.D.; The Most Powerful Telescope in Existence, by E. Neison, F.R.A.S.; The Moral Sense in the Lower Animals, by W. Lauder Lindsay, F.R.S.E.; Middle-Age Spiritualism; History and Methods of Palæontological Discovery, II, by Prof. O. C. Marsh; Interoceanic Canal Routes (illustrted), by Charles de Fourcy, C.E.; Premature Burials, by G. Eric Mackay; Why do Springs and Wells Overflow? by Joseph J. Skinner, Ph. D.; Correspondence, Editor's Table, Literary Notices, Popular Miscellany, and Notes.

THE *American Journal of Science and Art* for December contains original articles upon Photographing the Spectra of the Stars and

Planets, by Henry Draper; Artificial Fertilization of Oyster Eggs, and Embryology of the American Oyster, by W. K. Brooks; Origin of the Loess, by G. C. Broadhead; Observations on the Planet Hersilia and Dido, by C. H. F. Peters; Triple Objectives, with Complete Color Correction, by C. S. Hastings; Geology of Virginia, by J. L. Campell; Character and Intensity of the Rays Emitted by Glowing Platinum, by E. L. Nichols; Recent Additions to the Marine Fauna of the Eastern Coast of North America, by A. E. Verrill; Geology of Galisteo Creek, New Mexico, by J. J. Stevenson; Geology of Catoosa County, Georgia, by A. W. Vogdes; New Jurassic Reptiles (Pl. 3), by O. C. Marsh. Also, summary of scientific intelligence on Chemistry and Physics, Geology and Natural History, Astronomy, miscellaneous scientific intelligence, and book notices.

PREMIUMS TO SUBSCRIBERS.

We have determined to continue the plan which proved so appropriate and acceptable for giving premiums to our subscribers last year, viz:

To any person who sends us $3.50 we will send the REVIEW for one year, and any $1.50 book published by D. Appleton & Co., S. C. Griggs & Co., Robert Clarke & Co., Houghton, Osgood & Co., Roberts Brothers, J. B. Lippincott & Co., John Wiley & Sons, Henry C. Lea, S. R. Wells & Co., or Ivison, Blakenan, Taylor & Co.

To any one sending us $3.75, we will send the REVIEW for one year and any $2.00 book published by any of the above firms.

Persons desiring to subscribe for the Review and purchase any book or books, *or subscribe for any other periodicals*, published or obtainable in this country, can obtain special rates by applying to the editor in person or by letter.

Clubs desirous of subscribing for the REVIEW can have the same privilege as single individuals, besides the advantage of reduced rates of subscription.

To persons wishing to purchase law, medical, scientific or miscellaneous books, and at the same time subscribe for a periodical which includes within its scope popular articles upon all branches of science, mechanic arts and literature, we deem this a particularly favorable offer.

BACK NUMBERS.—To any subscriber for the third year we will furnish the back numbers of the first and second year for $2.25 each set, ound, or $1.25 each unbound.

TESTIMONIALS.

As the third volume of the REVIEW will close soon, and we shall be asking our friends to renew their subscriptions, it may be well enough, by way of showing the estimation in which it is held among scientific men and periodicals in different parts of the country, to publish extracts from some of the encouraging letters and notices we have received. From them it will be observed that the REVIEW has met with favor not less in the East than in the West, and that even in Europe it has found some readers of note who have been kind enough to express their appreciation of it and its management:

University of Kansas, Chancellor's Office.
Lawrence, Kansas, March 31, 1879.

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I take this opportunity also to commend the REVIEW. The last number is especially rich. Count me among the paying subscribers, as per inclosed $2.50. Yours,

JAS. MARVIN.

University of the State of Missouri,
Columbus, Mo., May 13, 1879.

THEO. S. CASE, Esq.,

My Dear Sir: I can but congratulate you on the excellence of your journal, and I will try to aid you with an occasional article.

* * * * * * *

Yours truly,

G. C. SWALLOW,

Academy Natural Sciences,
Philadelphia, Apr. 23, 1878.

I regret to-day that the March number of your valued journal has not been received at the academy. Will you have the goodness to supply a copy, that our set may be kept complete? Yours truly.

EDW. J. NOLAN, Sec'y.

Prof. E. T. Nelson, Wesleyan University, Delaware, Ohio, writes Dec. 1, 1878, as follows:

"I have just read the November number of

your monthly with great pleasure and profit. I did not know that so interesting a journal was published in the West."

Prof. O. T. Mason, Columbian College, D. C., the distinguished American anthropologist, writes, Jan. 20, 1879:

"I have frequently promised myself the pleasure of showing my appreciation of your very creditable journal by sending you something from the foreign field, &c."

Hon. B. B. Cahoon, of Fredericktown, Mo., writes, January 30, 1879:

"I am much pleased with the REVIEW, and it is well worth the subscription price ($2.50), which I inclose to renew mine."

Boston Scientific Society,
January 31, 1879.

With thanks for kindness in sending your REVIEW to our Society, and congratulations upon the high standard it has reached, I am,

Ever yours,
J. RITCHIE, JR., Sec'y.

Philadelphia, Sept. 4, 1879.

DEAR SIR: In looking over our first volume of your journal I find we are wanting Nos. 2 and 5 to complete the same. Be kind enough to forward the above, as they will complete our set, which will be very desirable. Yours respectfully,

E. HILTEBRAND,
Librarian Franklin Institute.

Osage City, Kansas, Sept. 9, 1879.

I am much pleased with the articles in the number before me, and I deem it a better work for the general reader than most of the scientific journals of the present day.

Yours &c., J. W. JACKSON.

Linton, Green Co., Indiana.
July 24, 1879.

* * * * * * *

I like the Review exceedingly well, and should it continue as interesting and valuable as at present I promise you a permanent subscription. Very truly yours,

Dr. W. EDWIN GROUND.

St. Louis, Nov. 4, '78.

* * * * * * *

It will give me pleasure to do anything in my power to further your enterprise. Your journal is excellent and most creditable to yourself and the Great West, and much prized by Your obedient servant,

A. J. CONANT.

New York, Oct. 8, 1879.

I have offered to send the REVIEW to the library of the Metropolitan Museum of Art, of which Gen. L. P. di Cesnola is director, as its archæological papers will there be appreciated, and would like, therefore, a full set from the commencement.

Very sincerely,
Dr. F. A. CASTLE.

Prof. Wm. Dawson, the noted Quaker Shoemaker Astronomer, writes:

* * * * * * *

"In one sense I seem to have reading matter enough without the REVIEW, but it is too good to be without."

Chemical Laboratory, Oberlin College,
Oberlin, Ohio, March 3, 1879.

I am under many obligations for your courtesy in the form of copies of the REVIEW, which I have read with interest. I have missed your journal from my table, and should like much to obtain the numbers from July to December, 1878.

Yours very truly,
WM. K. KEDZIE.

Topeka, March 29, 1878.

* * * The REVIEW is a very useful publication, and must contribute very sensibly to the material development of this section of the country, a record of whose history and development it is the object of this society to make up. Yours very truly,

F. G. ADAMS,
Sec. Kansas State Hist. Society.

Washington, Jan. 20, 1879.

* * * * * * *

I look upon your REVIEW as a very valuable addition to scientific journalism, and one especially interesting to the growing West.

Very truly yours,
H. W. HOWGATE, U. S. A.

PROFESSOR WILLIAM H. WAHL, of Philadelphia, associate editor of the *Engineering and Mining News*, published in New York City, writes, August 5th, as follows: "* * * * I take much pleasure in reading your REVIEW, and trust that you are succeeding with it."

SMITHSONIAN INSTITUTION,
WASHINGTON, D. C., June 18, 1879.

EXTRACT.

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Your REVIEW comes regularly and is always read with much interest.

Yours truly,

S. F. BAIRD, Sec'y.

THE KANSAS CITY REVIEW OF SCIENCE AND INDUSTRY, edited by T. S. Case, maintains the high character which was conspicuous in its beginning, for energy and thoroughness in a new department of Western literature.—*Phrenological Journal.*

KANSAS CITY REVIEW OF SCIENCE AND INDUSTRY.—We always hail the arrival of this excellent Magazine with genuine pleasure, for it always comes filled with a mass of reliable reading matter upon all important scientific and industrial topics of the day. Among the many contributors to the November number appear the names of Captain Howgate, the late Prof. B. F. Mudge, and Prof. F. E. Nipher. These are a few only of the contributors. Aside from contributions there is no publication of the kind that has as many and as ably written editorials. Col. Case is a gentleman of fine scientific attainments and one of the deepest students as well as a thorough pains taking writer. We hope to see the REVIEW receive, from the people of the West the support it so richly deserves. The price at which it is published ($2.50), places it within the reach of all.—*Western Homestead.*

WE congratulate the Kansas City REVIEW OF SCIENCE AND INDUSTRY on the rich variety presented in the July number. It is becoming one of the best as well as one of the cheapest of our scientific journals.—*Farm and Fireside, Springfield, Ohio.*

THE KANSAS CITY REVIEW OF SCIENCE AND INDUSTRY, Theo. S. Case, editor, comes to us filled, as usual, with valuable facts, well discussed theories, and useful suggestions. It speaks well for the intellectual growth of the country where such magazines flourish amid the hurry of the busy workers of the prairies of the west.—*The Daily Inter-Ocean.*

THE KANSAS CITY REVIEW OF SCIENCE AND INDUSTRY, published at Kansas City, Mo., comes to us full of reviews and interest. It has such a range of material that we are sure to find something in each one that is of interest to us. The general feature is of science as related to industrial pursuits, but it is also in other important topics creditably handled.

—*Boston Journal of Commerce.*

"A PROPHET is not without honor," etc., has many exemplifications, and one of the best illustrations is that people are prone to look at things at home in a careless light, because they are familiar with them. And we have a case in point in our Kansas City REVIEW OF SCIENCE AND INDUSTRY, and its contributors. For example, Dr. E. R. Heath, of Wyandotte, read a paper before the Academy of Science here, on "Peruvian Antiquities," to less than fifty people. It was published in the REVIEW, and created no particular notice. Yet the London *Quarterly Journal of Science*, the accredited organ of the scientific world of Great Britain, copies it in full as a valuable contribution to knowledge. Then there appeared in the REVIEW a paper entitled "Some Peculiarities of Our Ornithology," from the pen of Ermine Case, Jr., and it has been printed, with high praise, in the London *Scientific and Literary Review.* The *Journal* spoke of it at the time as one of the most interesting chapters in natural history, and we are glad to see it honored in such high quarters. The two events are quite a feature in the cap of the Academy, the REVIEW, and, above all, the writers respectively.—*Kansas City Journal.*

THE bound volume of the REVIEW comprises nearly 800 pages of well printed, substantial and reliable reading matter, comprising original articles by more than thirty able writers, and selected articles from a list of more than fifty of the best scientific, medical, educational, agricultural and literary periodicals in the world. The REVIEW has been warmly welcomed and many of its articles copied by the press of this country and England, both scientific and literary, and has

attained a regular subscription list very flattering to the first publication of the kind which has ever been established in the West. Col. Case has proved himself admirably fitted to conduct such a magazine, and we look to see it grow and flourish vigorously under his capable management.—*Kansas City Times.*

THE articles in the Kansas City REVIEW OF SCIENCE AND INDUSTRY are by the best writers, and contain much of interest to the philosophical and industrial world. This serial only requires to be known to have a wide circulation, and should be read by every intelligent and educated person. We heartily recommend it to our readers.—*Exporter and Importer.*

WE have upon our table the January number of the REVIEW OF SCIENCE AND INDUSTRY, edited by Theo. S. Case and published at Kansas City. As it purports to be, it is a magazine of science and industry, and is without an equal in the West. The names of some of the leading scientists and educators of the day grace its pages as contributors. It is an epitome of western progress, and is destined to become, in the near future, to the West what the *Popular Science Monthly* is to the East.

—*Normal Courier.*

WE are in receipt of the February number of the Kansas City REVIEW OF SCIENCE AND INDUSTRY, published at Kansas City, Mo., at $2.50 per annum. This monthly is one that has, in spite of all obstacles, attained a recognized place in American literature, and presents an array of scientific articles highly creditable to Western authors. The number before us is the second number of the third volume, and is one of more than ordinary literary value.—*The New West.*

THIS excellent magazine, the Kansas City REVIEW OF SCIENCE AND INDUSTRY, now in its third volume, comes to us each month replete with the latest and best thought on scientific matters. Purely a western enterprise, it is a fitting reflex of the intelligence and genius of the empire that is so rapidly building up in this Mississippi valley.

—*Chronoscope.*

WE are glad to note the success that Col. Case is meeting with in the publication of his REVIEW OF SCIENCE AND INDUSTRY. It takes an uncommonly good thing, such as the REVIEW is, to gain the support of a people who are as deeply immersed in business as those of the West just now. It is as good as anything of the kind in the country, and very cheap at $2.50 per annum.—*North Topeka Times.*

THE KANSAS CITY REVIEW OF SCIENCE AND INDUSTRY is a magazine deserving the patronage of all the intelligent people of the West, being, as it is, the medium through which the best writers of the West give their discoveries and theories to the reading public. The November number, now before us, falls in no respect behind any similar periodical in the country.—*Brookfield Gazette.*

For Advertising Rates Address Theo. S. Case, Kansas City, Mo.